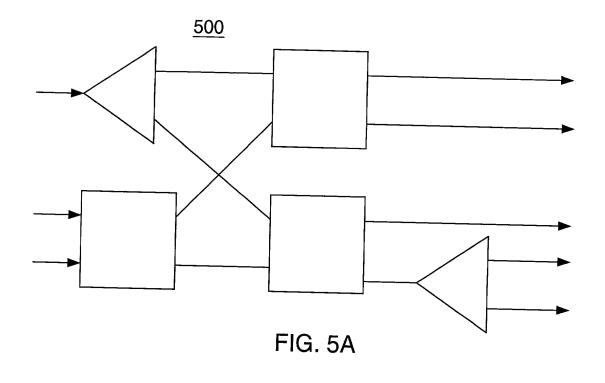
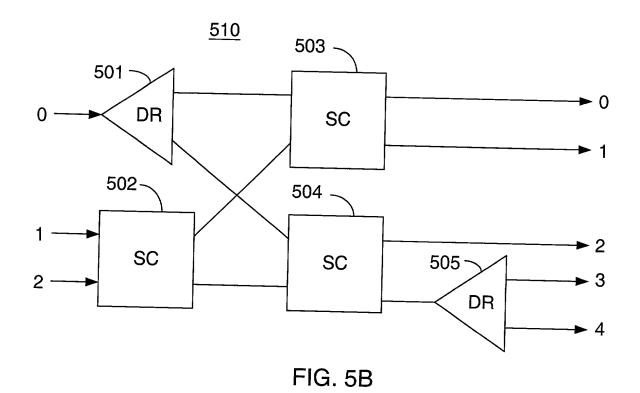


FIG. 4





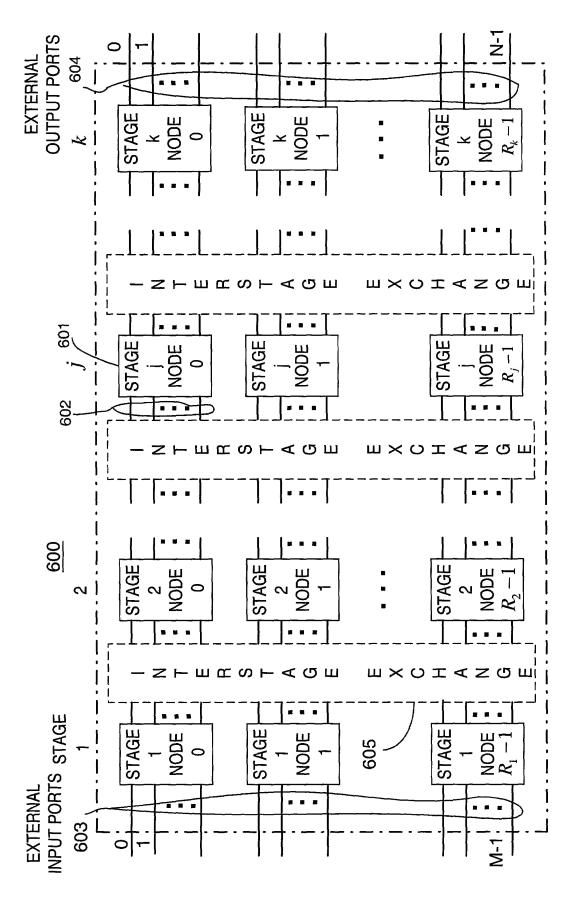
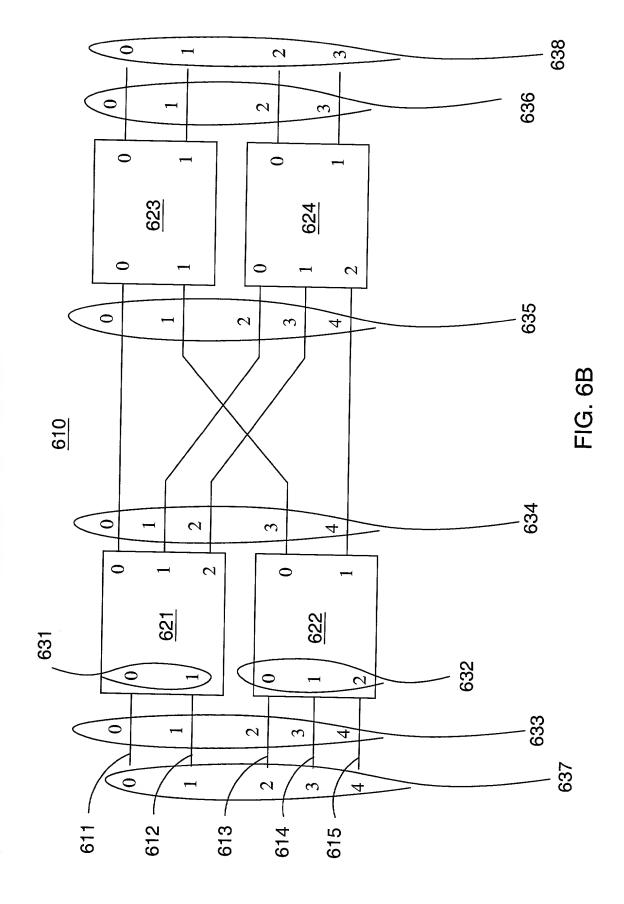
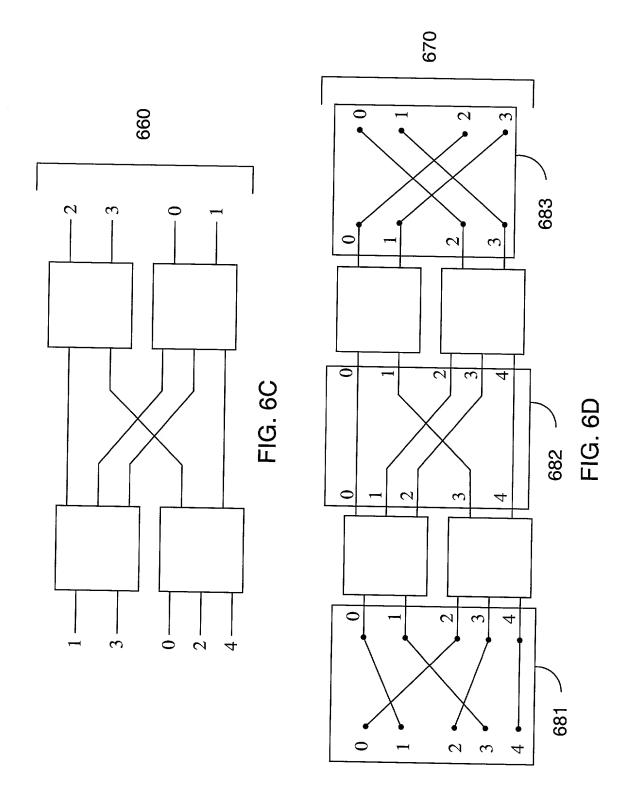
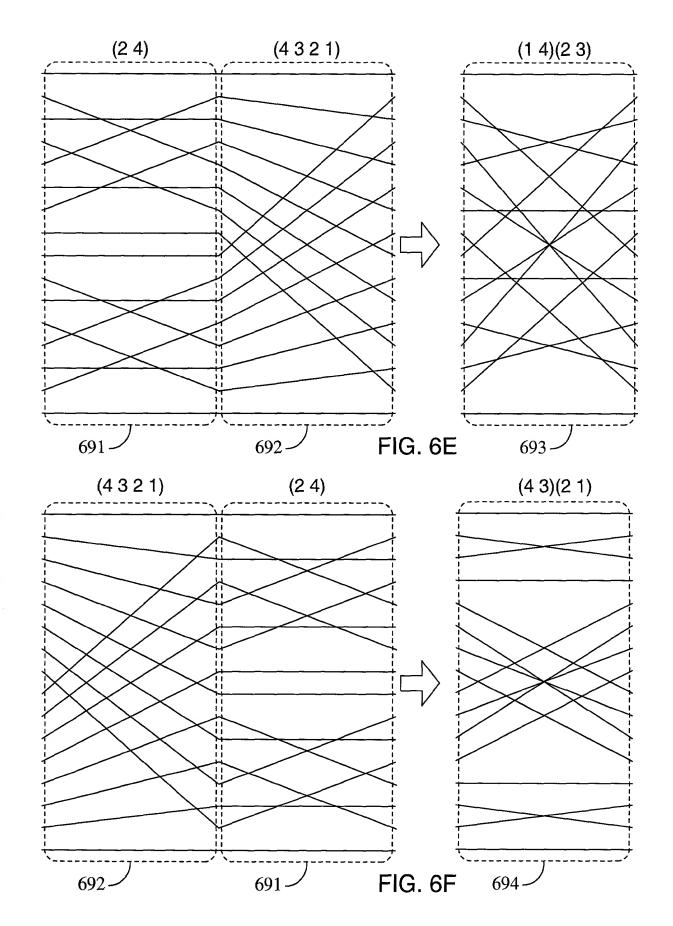
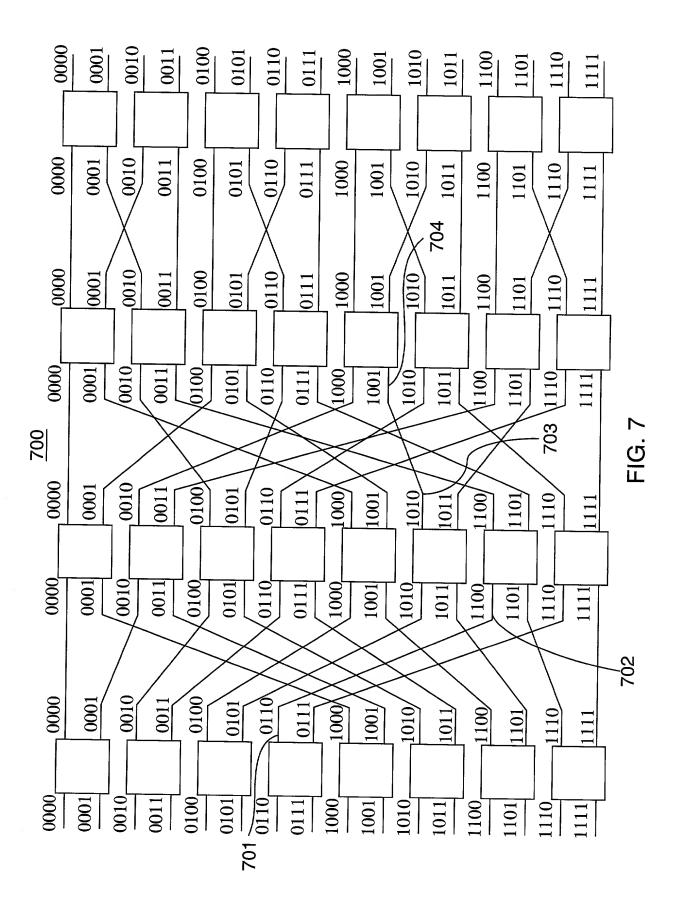


FIG. 6A

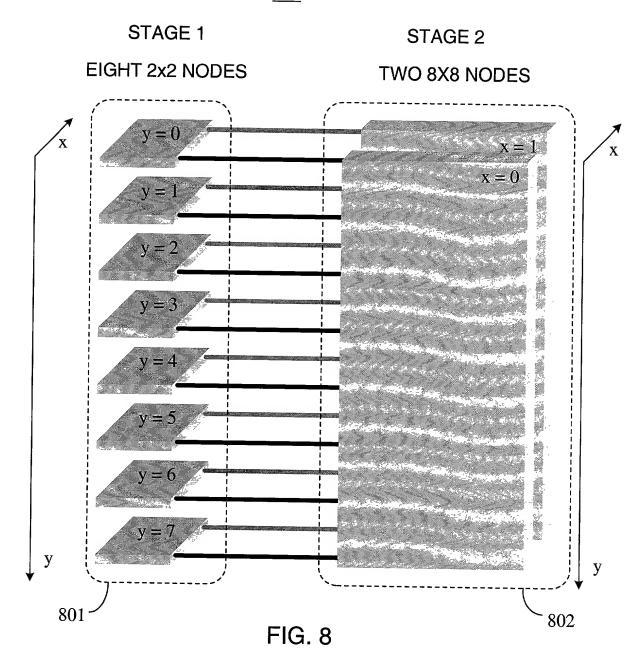


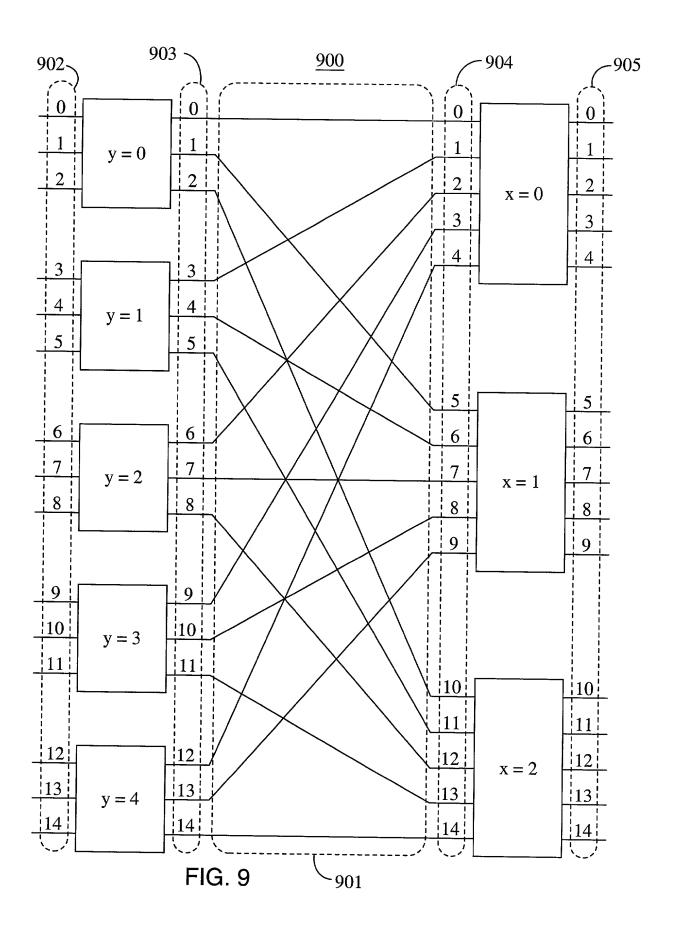


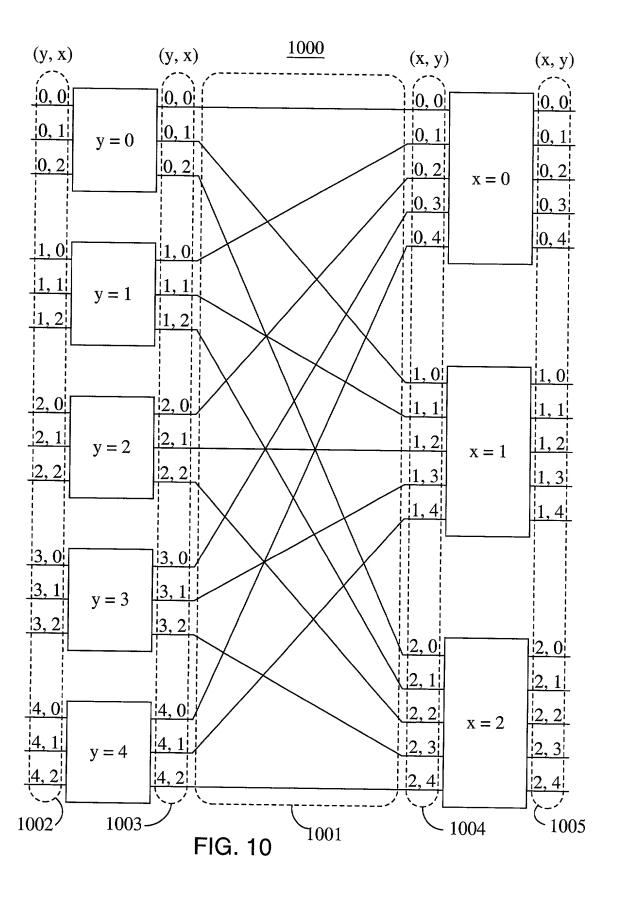


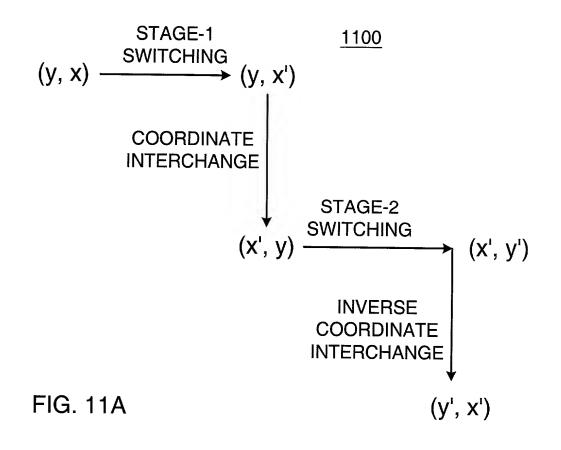


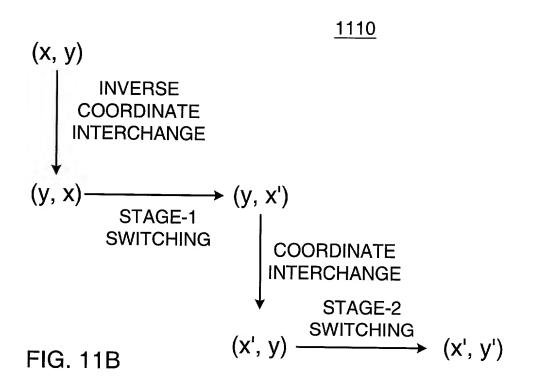
## <u>800</u>

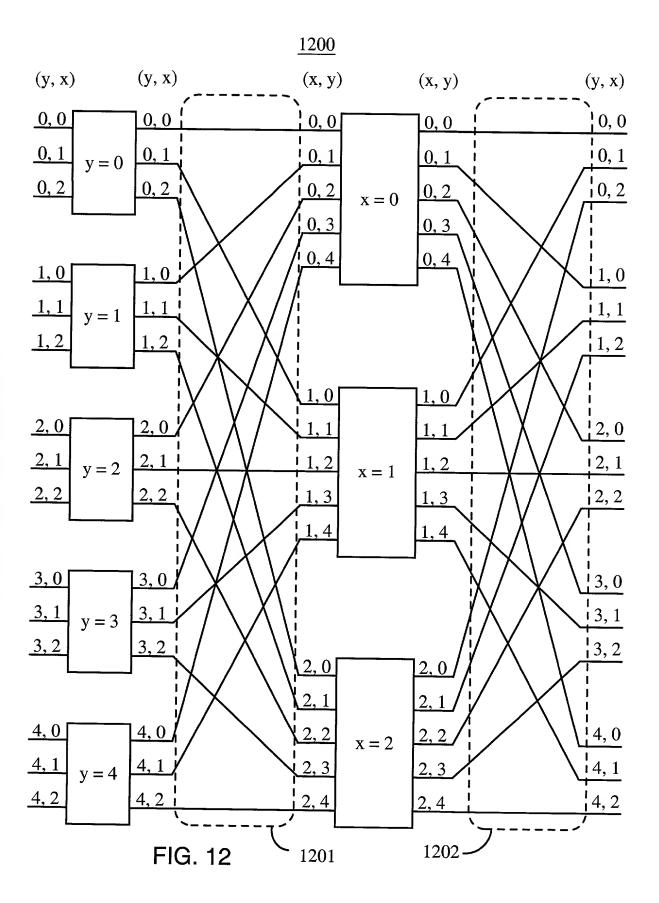


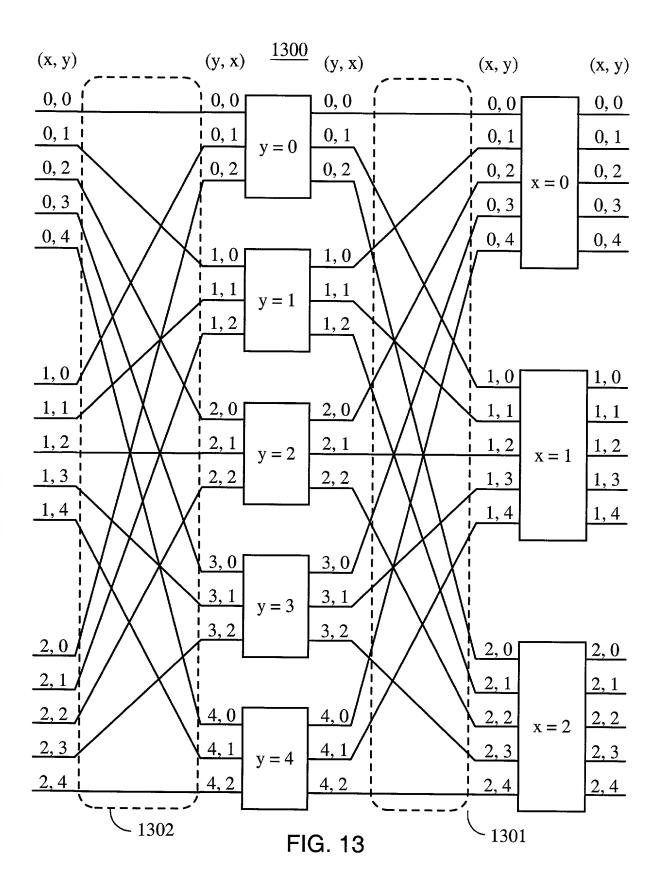


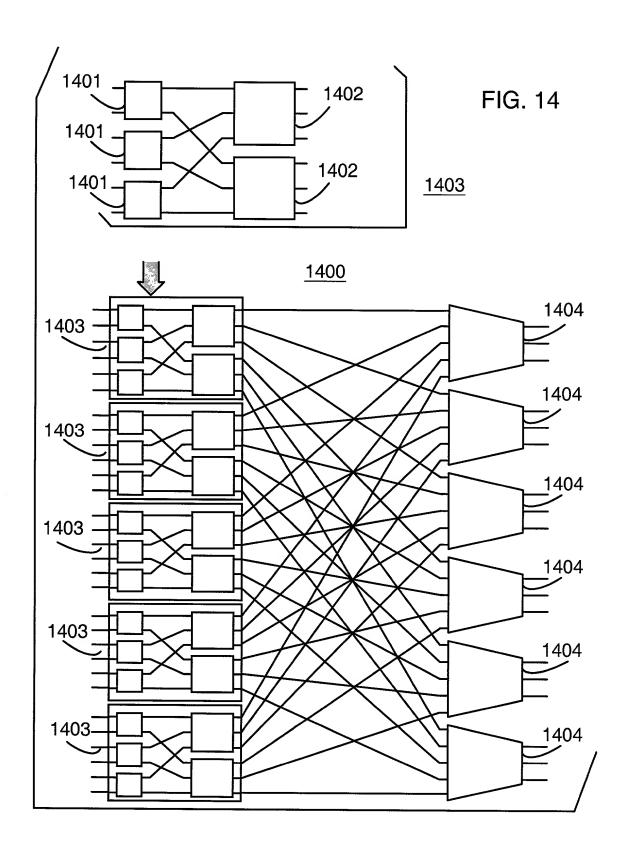












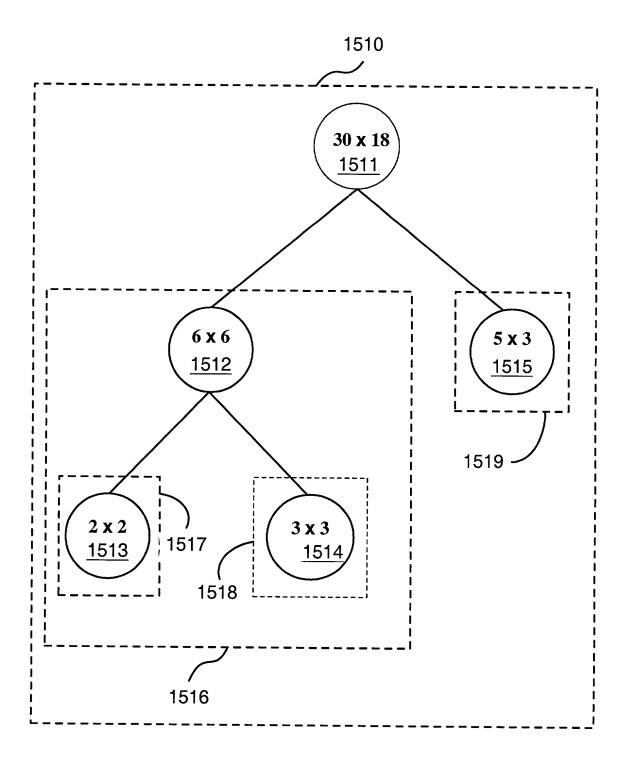
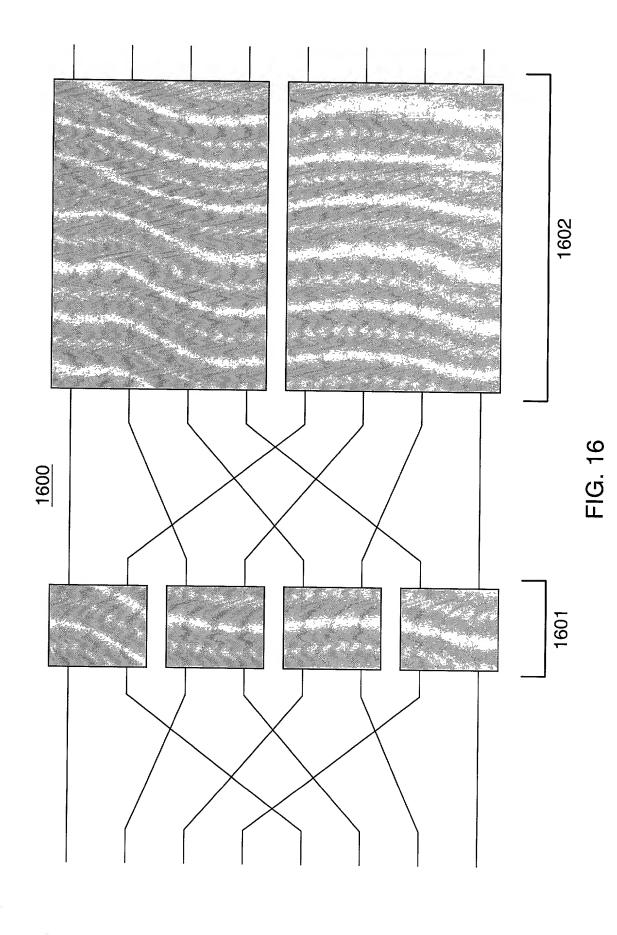
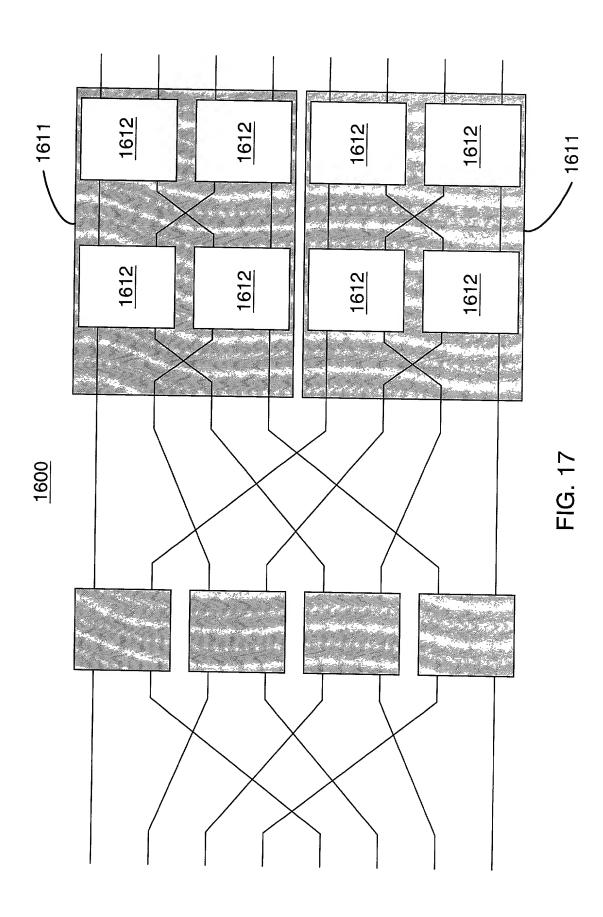
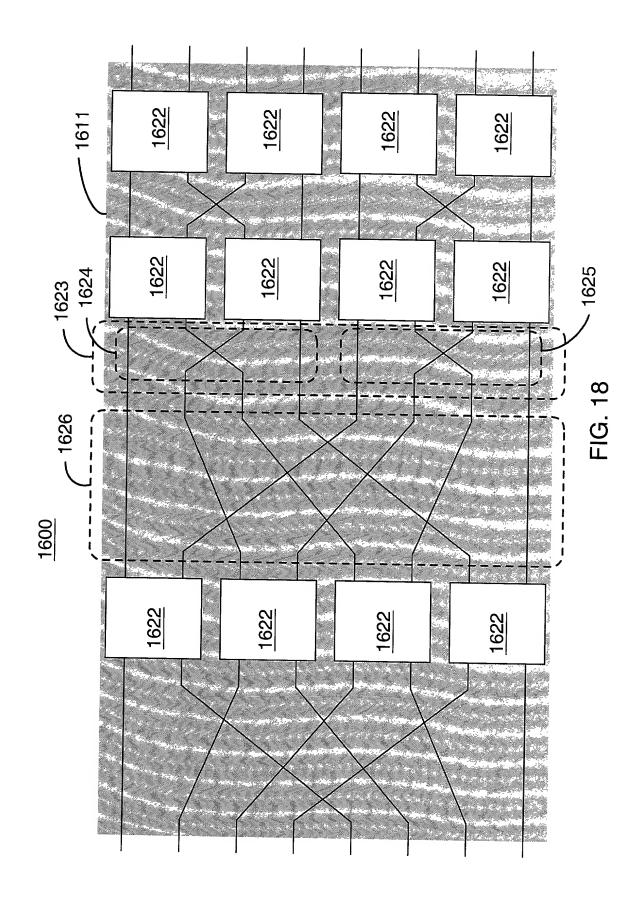
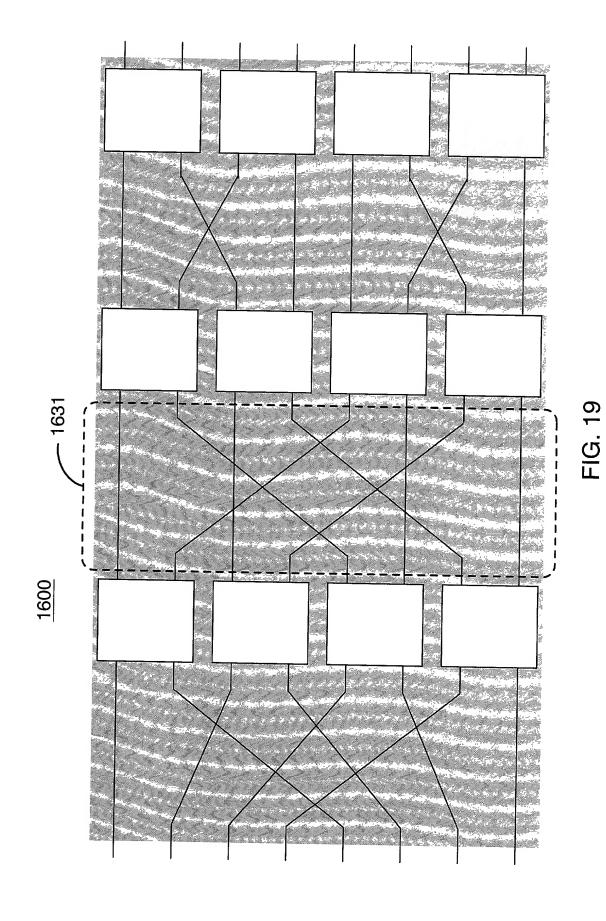


FIG. 15









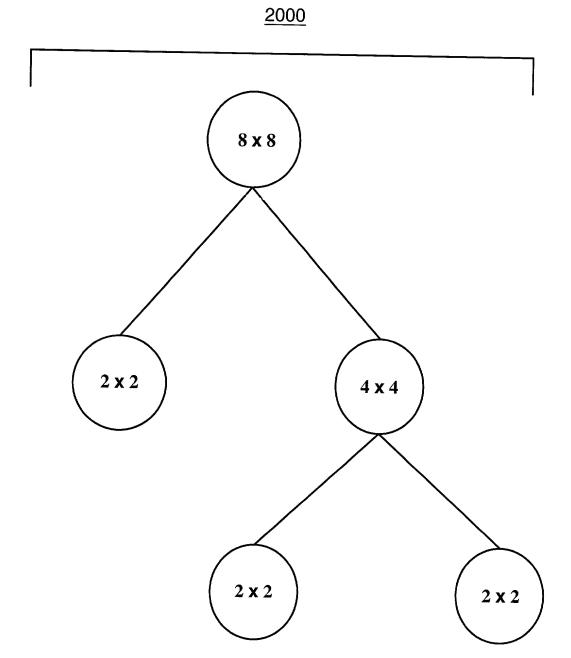
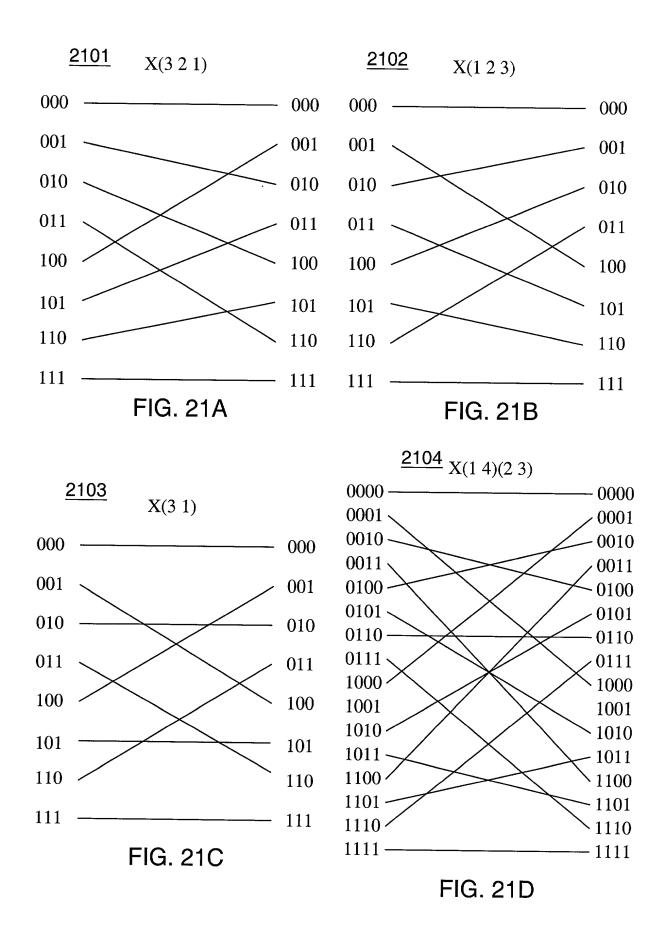
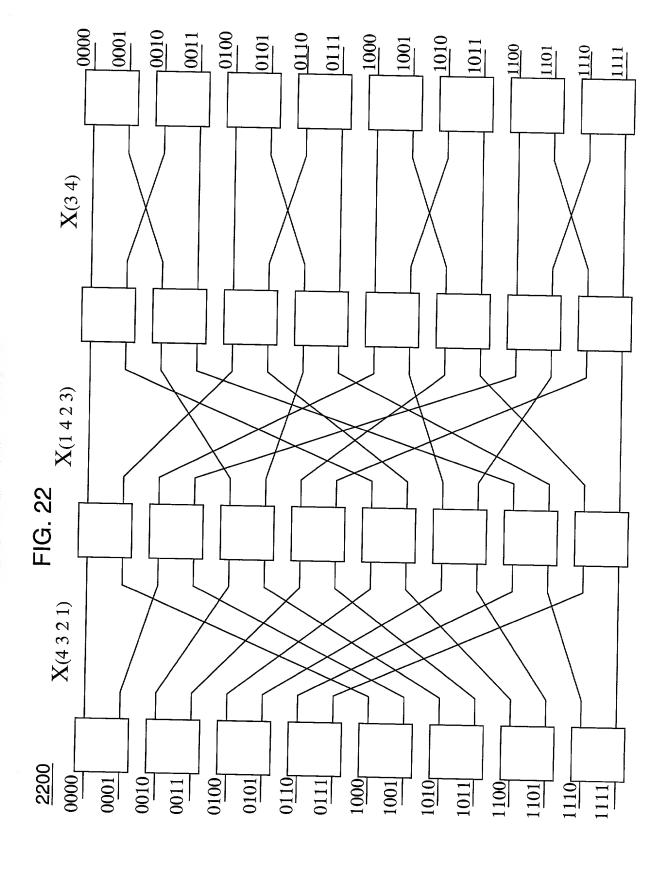
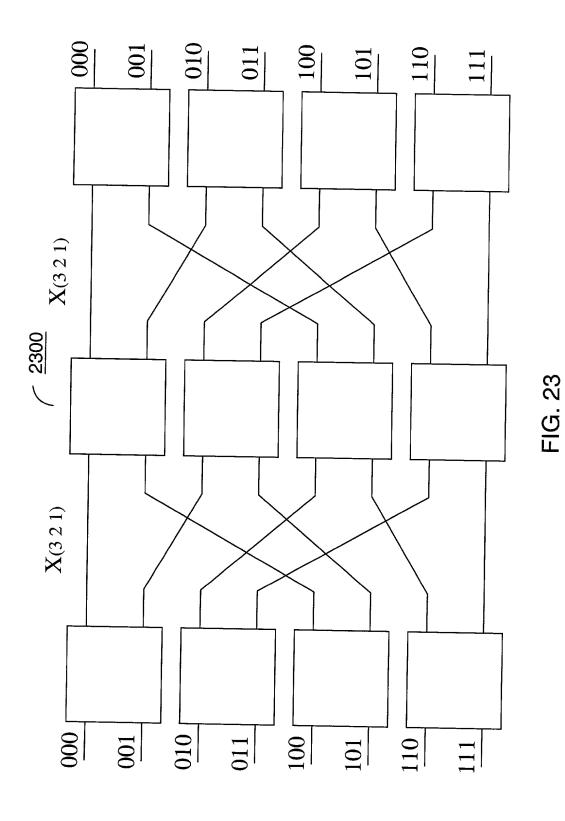


FIG. 20







## <u>2400</u>

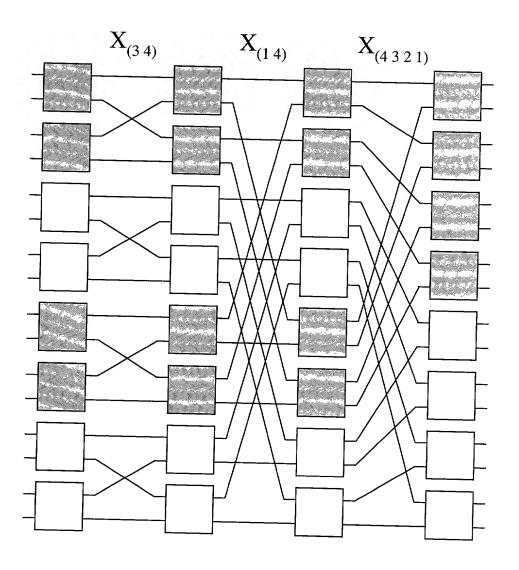
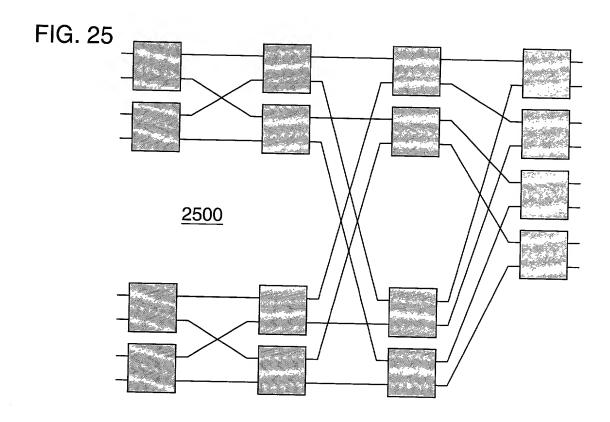
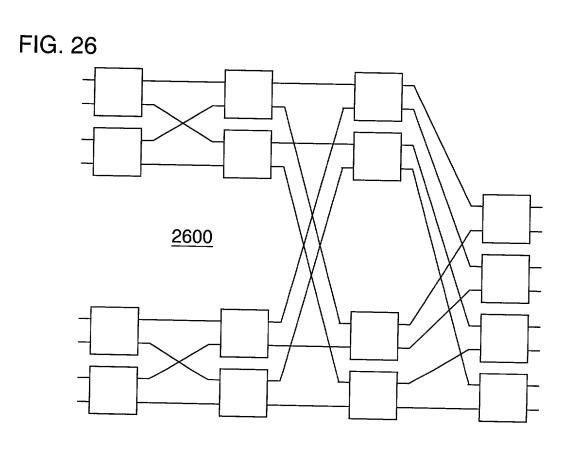
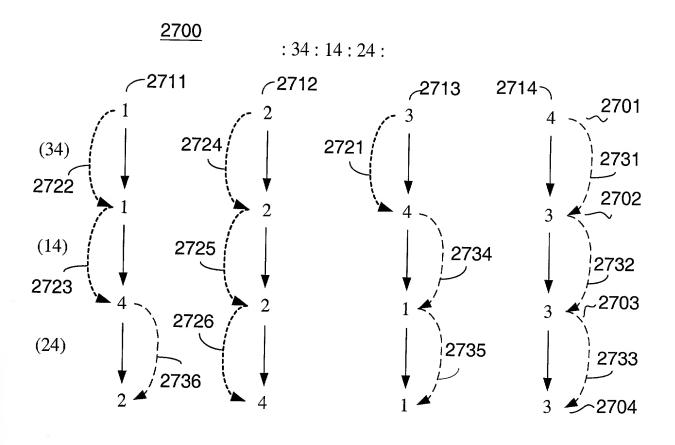


FIG. 24







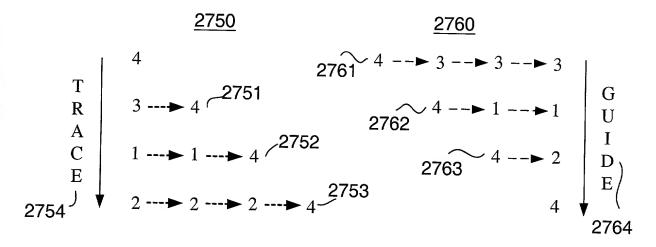


FIG. 27

Trace 
$$\begin{pmatrix} 4321 \end{pmatrix} \div (14) \div (24) \div (34) \div \\ 2 & \rightarrow & 1 & \rightarrow & 4 \\ & 2 & \rightarrow & 2 & \rightarrow & 4 \\ & 4 & \rightarrow & 3 & \rightarrow & 3 & \rightarrow & 4 \end{pmatrix}$$

FIG. 28A

$$(4321) : (14) : (24) : (34) :$$

$$4 \rightarrow 1 \rightarrow 1 \rightarrow 1$$

$$4 \rightarrow 2 \rightarrow 2$$

$$4 \rightarrow 3$$
Guide
$$4 \rightarrow 3$$

FIG. 28B

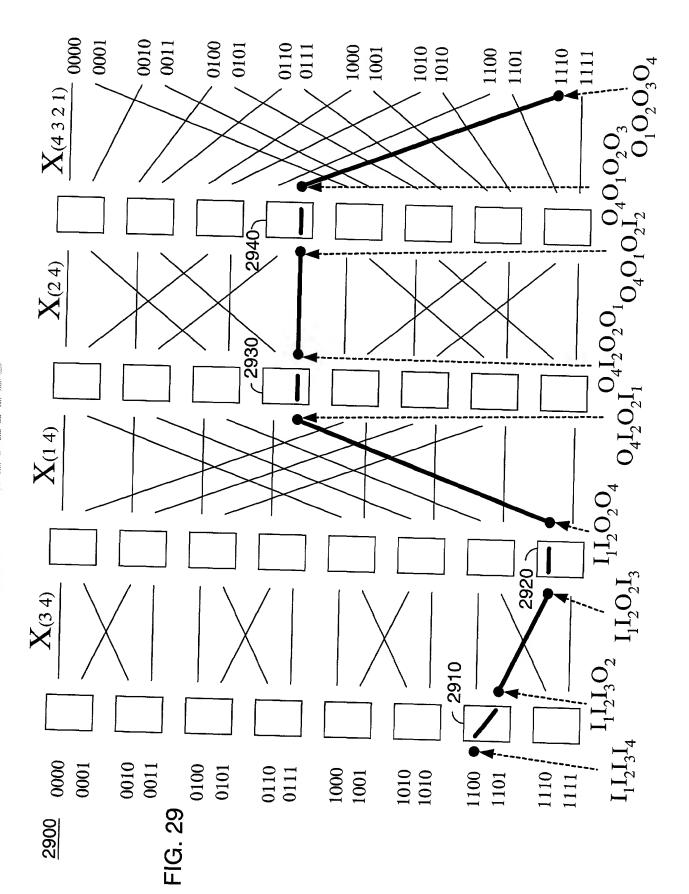


FIG. 30A

Trace 
$$(34) : (14) : (4321) :$$
 $4$ 
 $3 \rightarrow 4$ 
 $3 \rightarrow 4 \rightarrow 1 \rightarrow 4$ 

FIG. 30B

## 3100 IN I<sub>1</sub> SWITCH 1 OUT (3 4)IN SWITCH 2 OUT (14) IN SWITCH 3 OUT (4 3 2 1) IN SWITCH 4 OUT

FIG. 31

3110

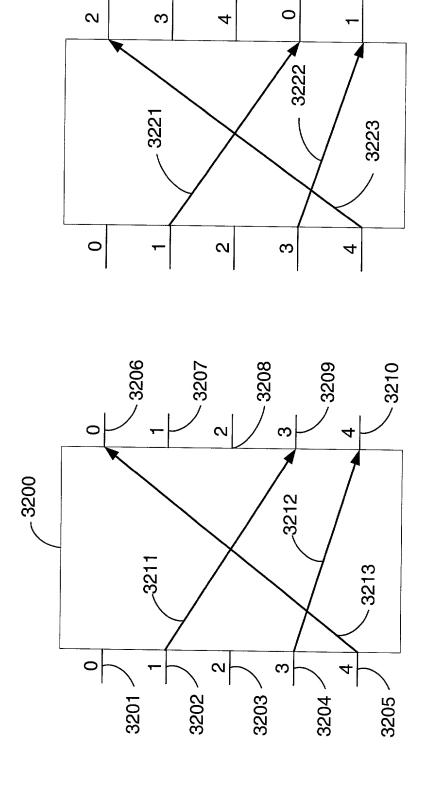
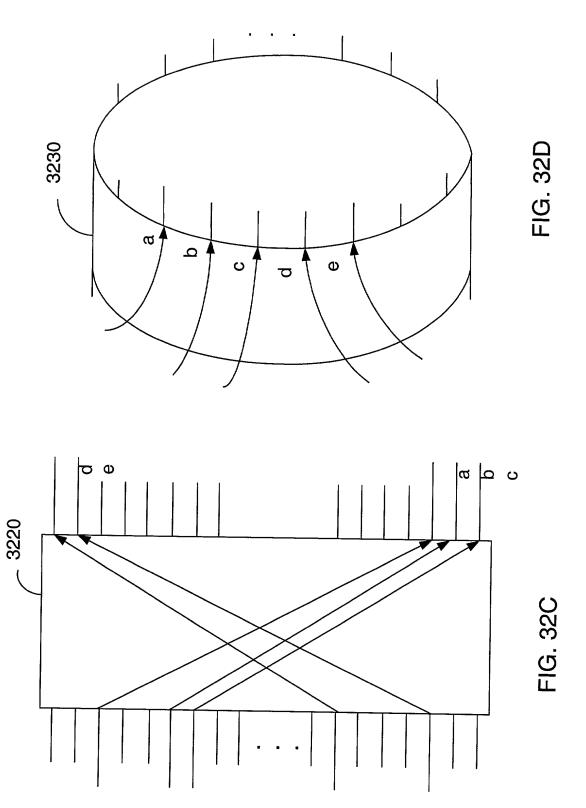
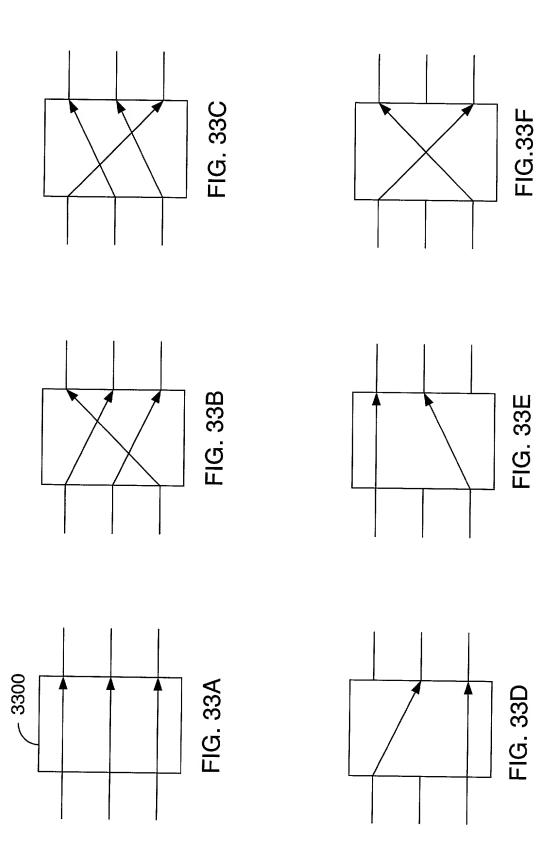


FIG. 32B

FIG. 32A





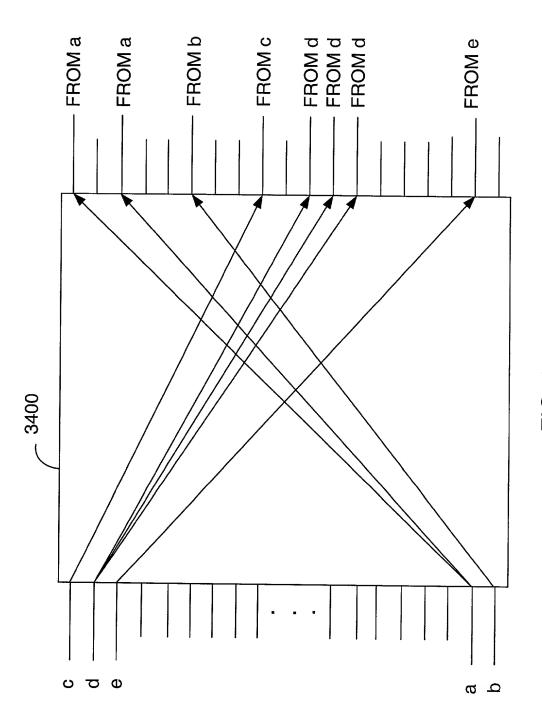
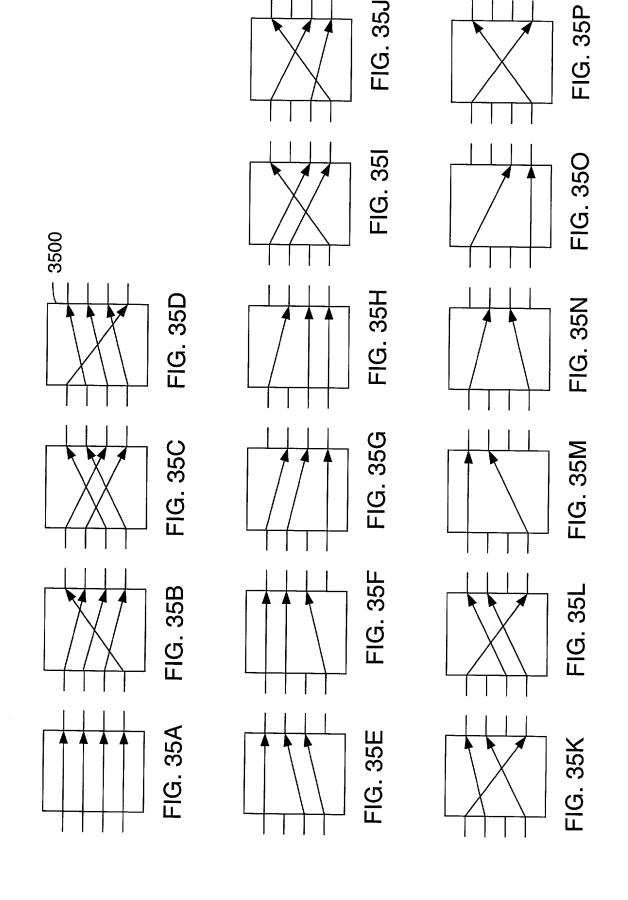
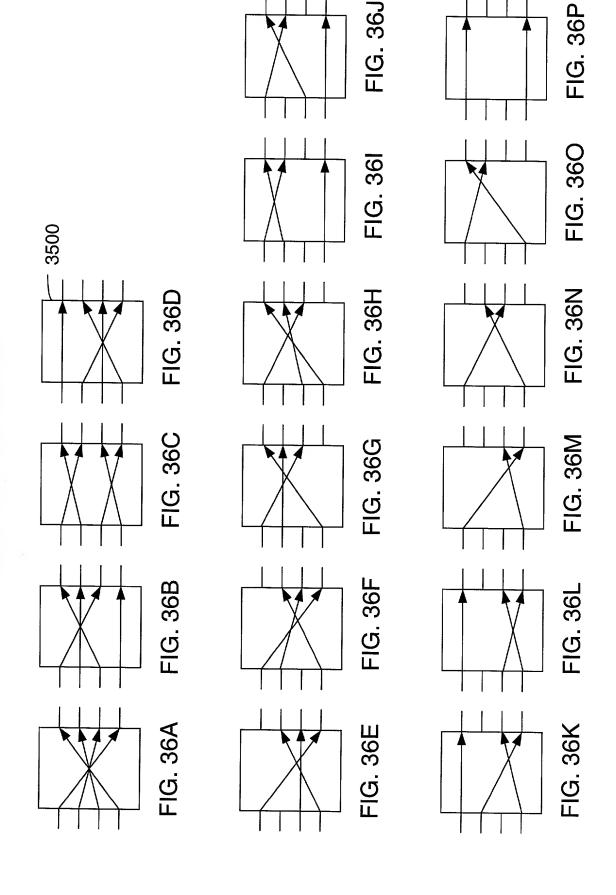
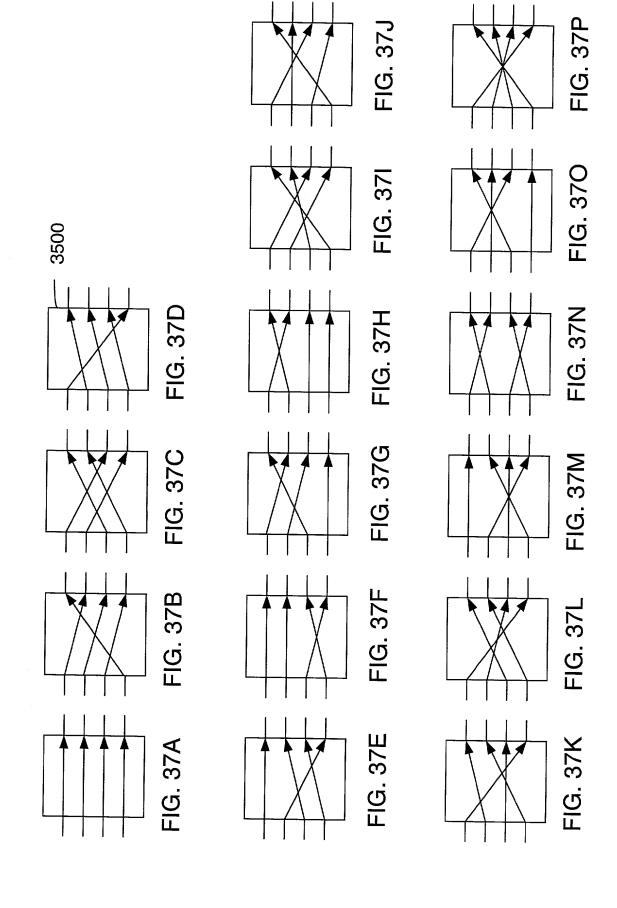
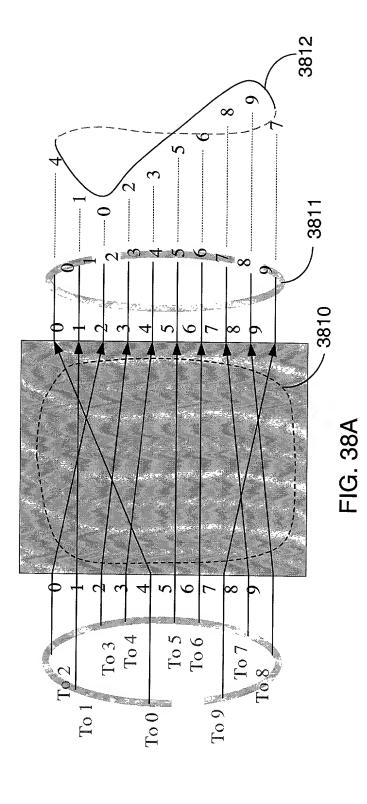


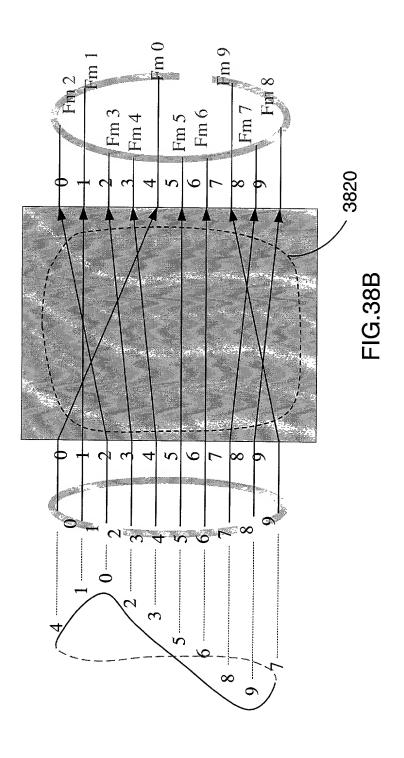
FIG. 34











3900

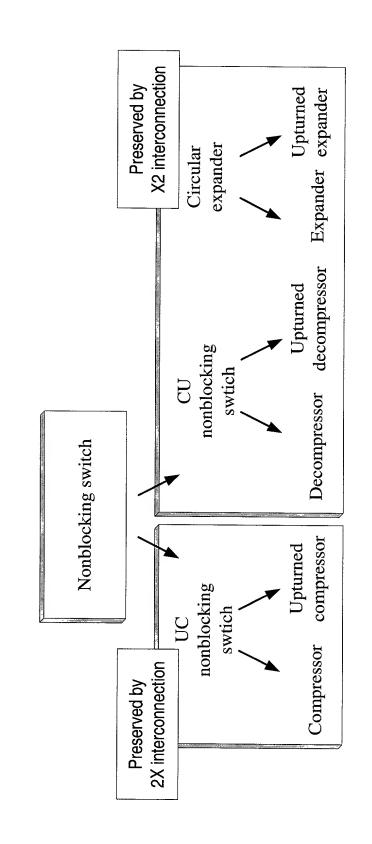
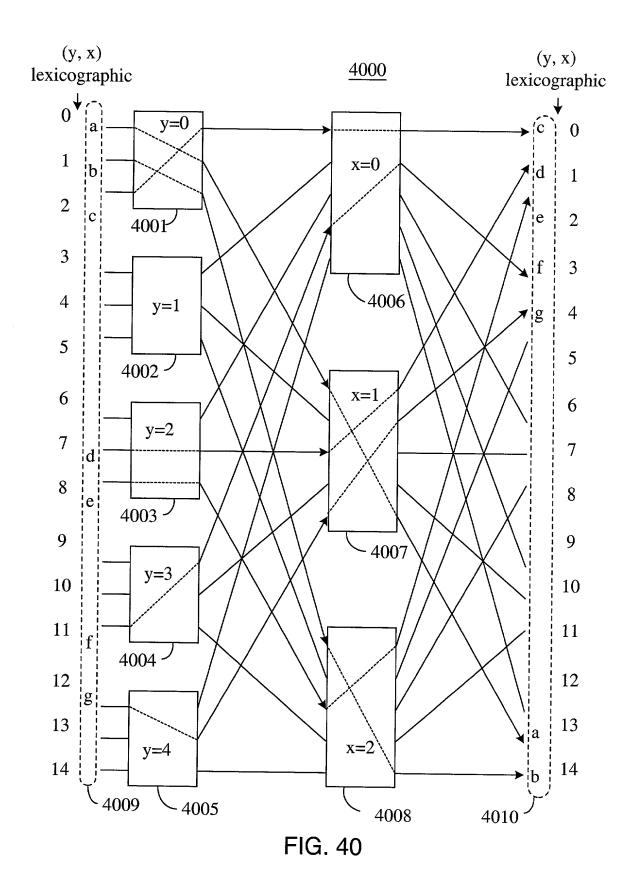


FIG. 39



#### 4100

Preservation of the (1) compressor, (2) upturned compressor and (3) UC nonblocking properties of a switch

Recursive 2X constructions from arbitrary building blocks

Recursive 2X constructions from cells

Banyan-type networks with monotonically decreasing trace and guide

#### 4110

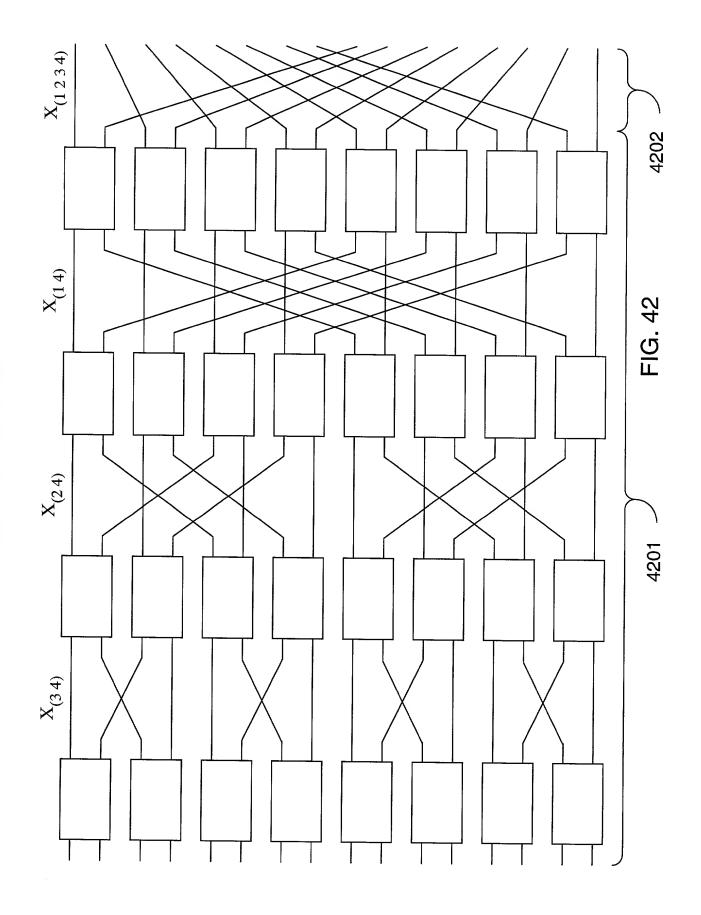
Preservation of the (4) decompressor,
(5) upturned decompressor,
(6) CU nonblocking,
(7) expander,
(8) upturned expander and
(9) circular expander
properties of a switch

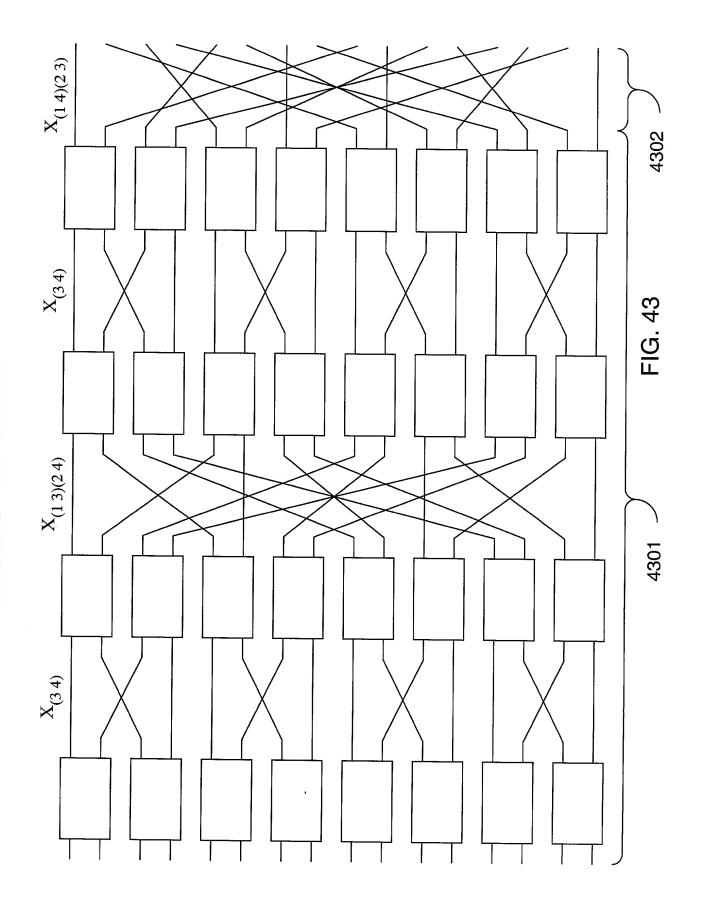
Recursive X2 constructions from arbitrary building blocks

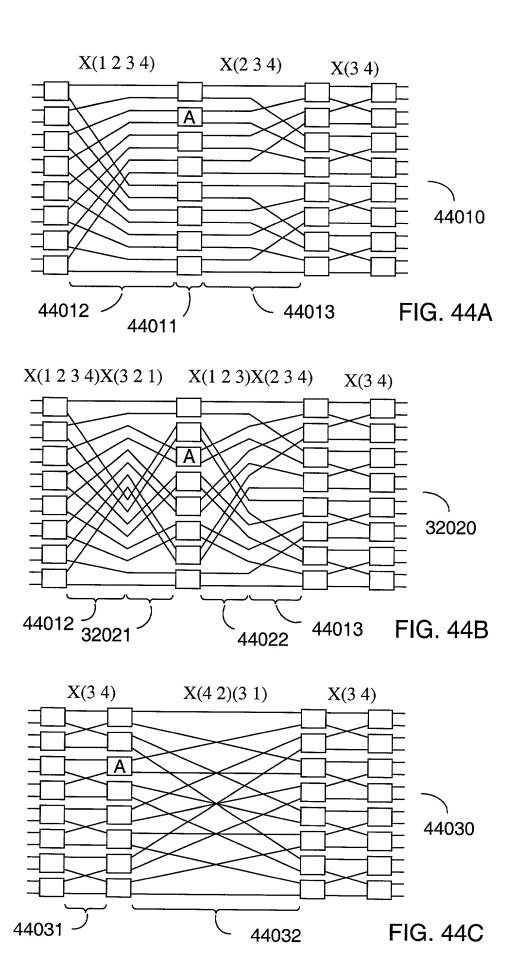
Recursive X2 constructions from cells

Banyan-type networks with monotonically increasing trace and guide

FIG. 41







Equivalence banyan-type in stronger networks among match of output exchange only (<==> common guide among Equivalence requiring the the networks) (<==> common trace and guide Equivalence without requiring the match of I/O exchanges Equivalence requiring the match of I/O exchanges among the networks) (unconditional) match of input exchange only (<==> common trace among Equivalence requiring the the networks)

FIG. 45

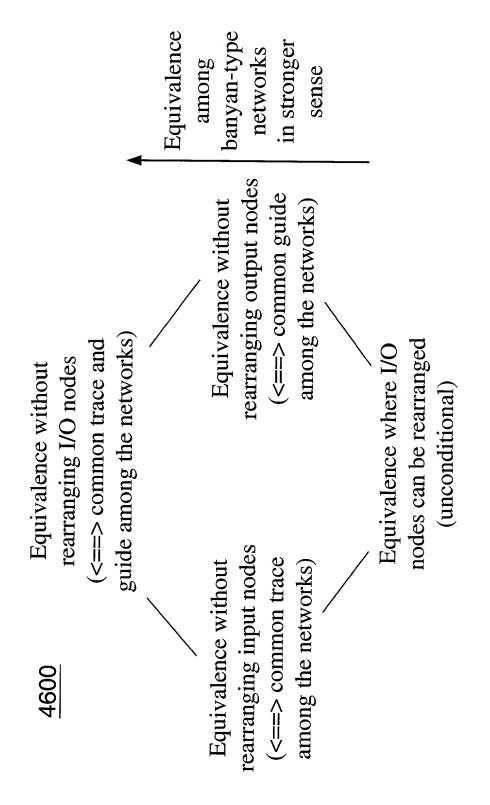


FIG. 46

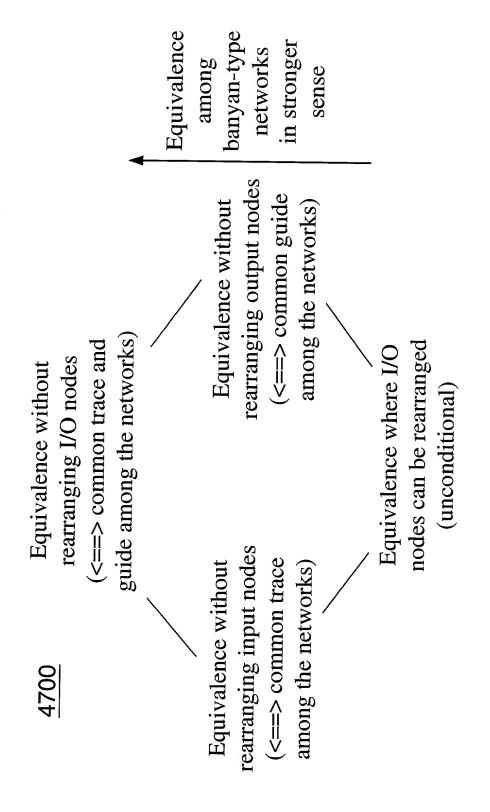


FIG. 47

Equivalence among bitpermuting in stronger rearranging output nodes (<==> common guide Equivalence without among the networks) guide among the networks) (<==> common trace and rearranging I/O nodes Equivalence without rearranging input nodes (<==> common trace Equivalence without among the networks) 4800

networks

sense

FIG. 48

(<==> trace and guide of one network can be

rearranged

Equivalence where I/O nodes can be

repsectively changed to that of the other

network by a permutation)

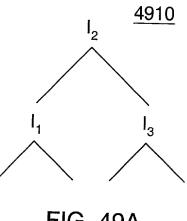


FIG. 49A

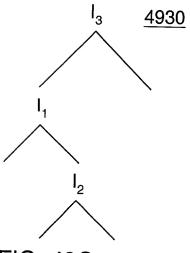
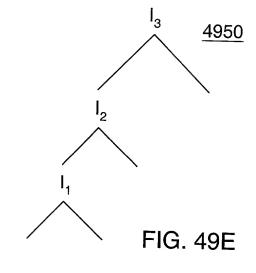


FIG. 49C



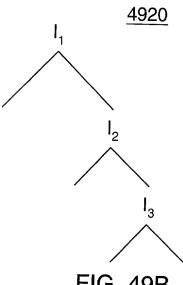


FIG. 49B

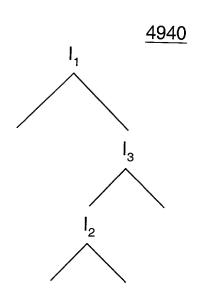
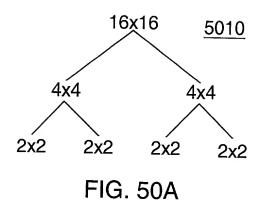
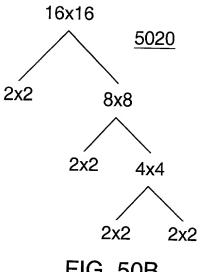
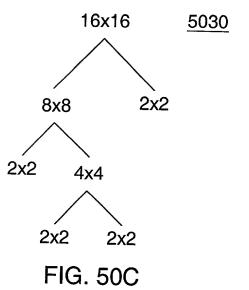
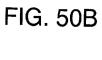


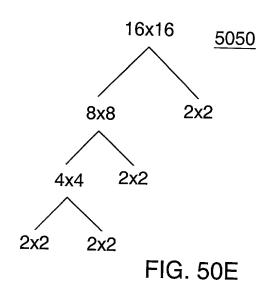
FIG. 49D











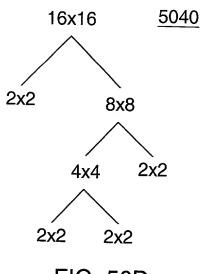


FIG. 50D

### <u>5100</u>

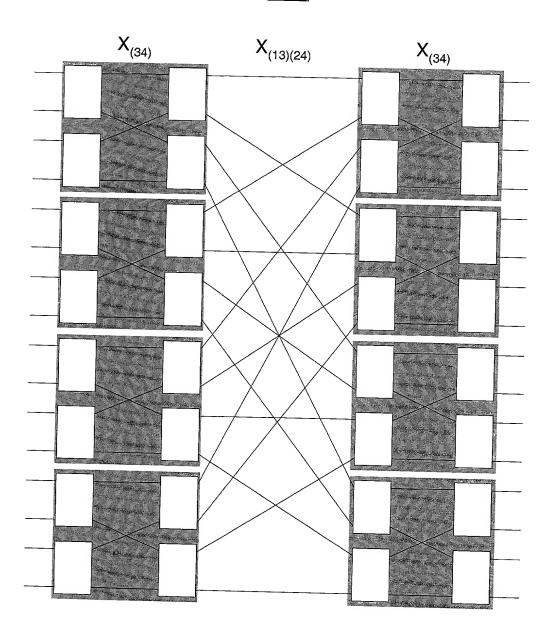


FIG. 51

# <u>5200</u>

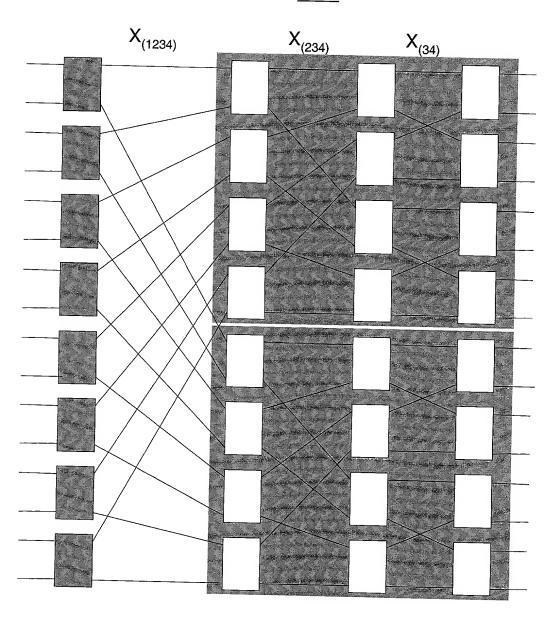
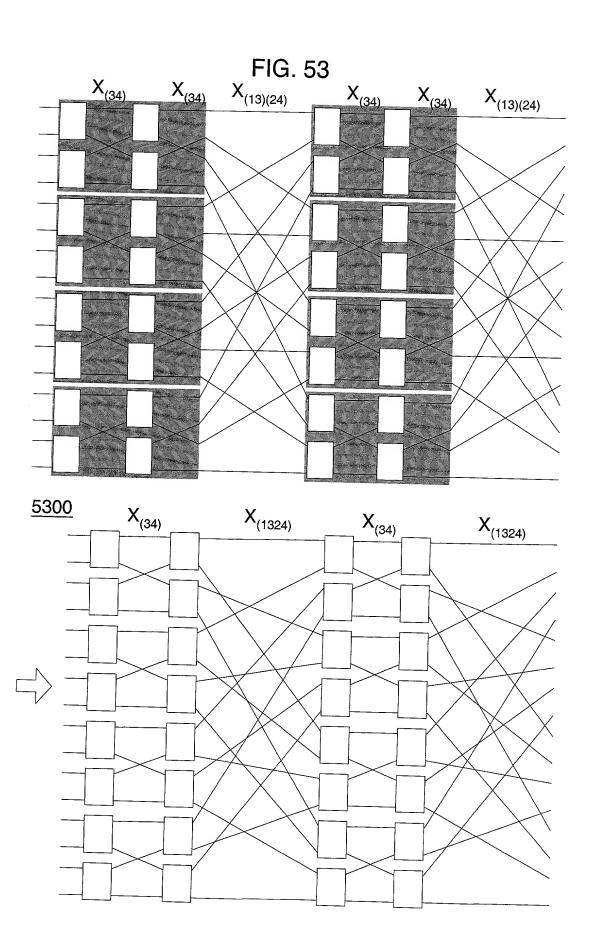


FIG. 52



### <u>5400</u>

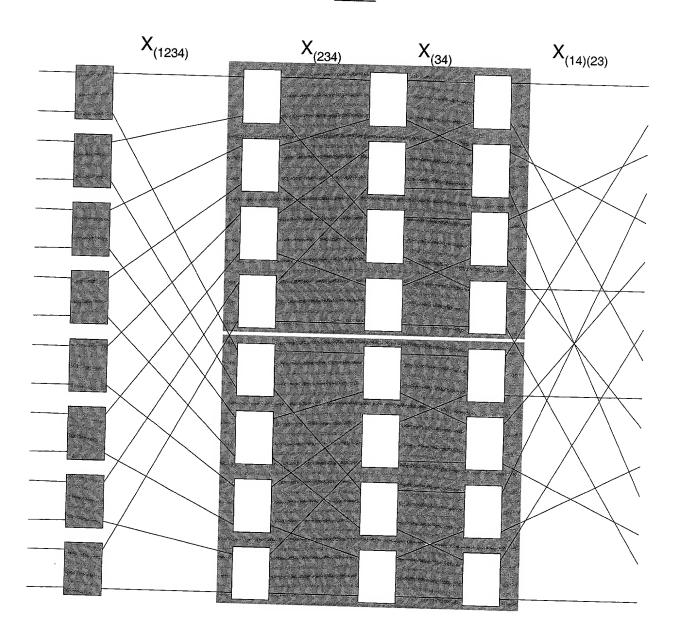


FIG. 54

# <u>5500</u>

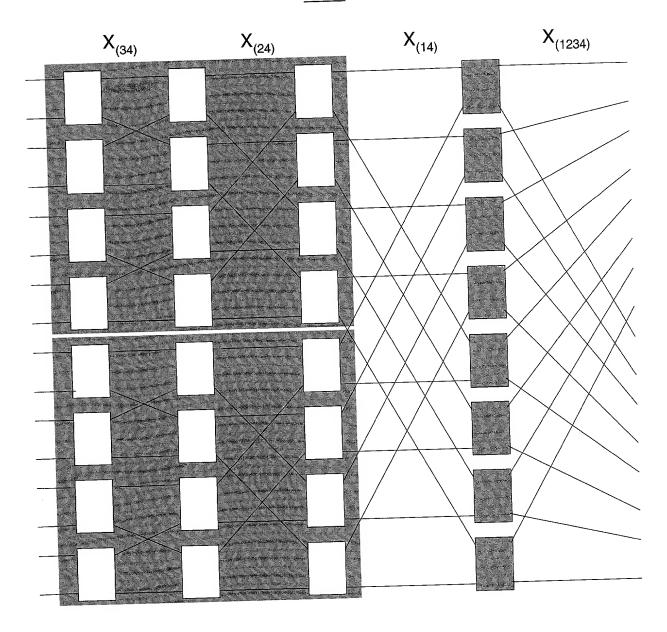
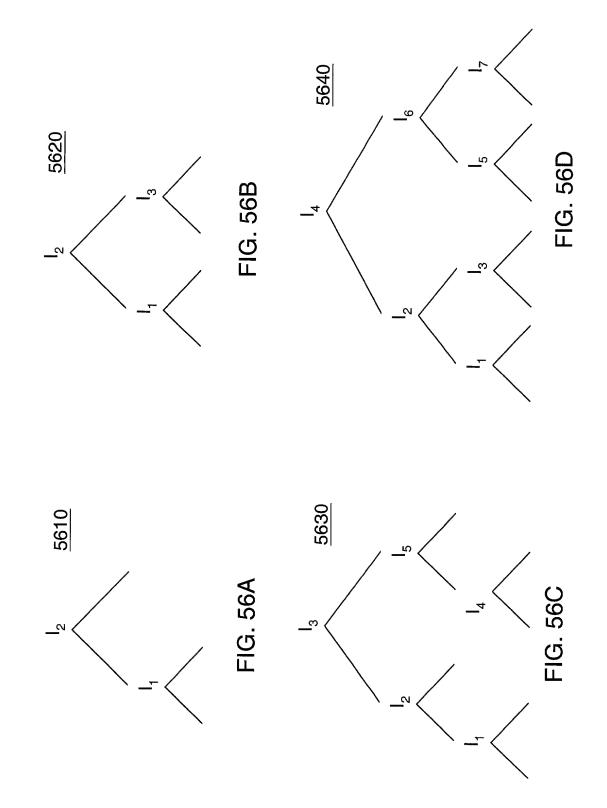
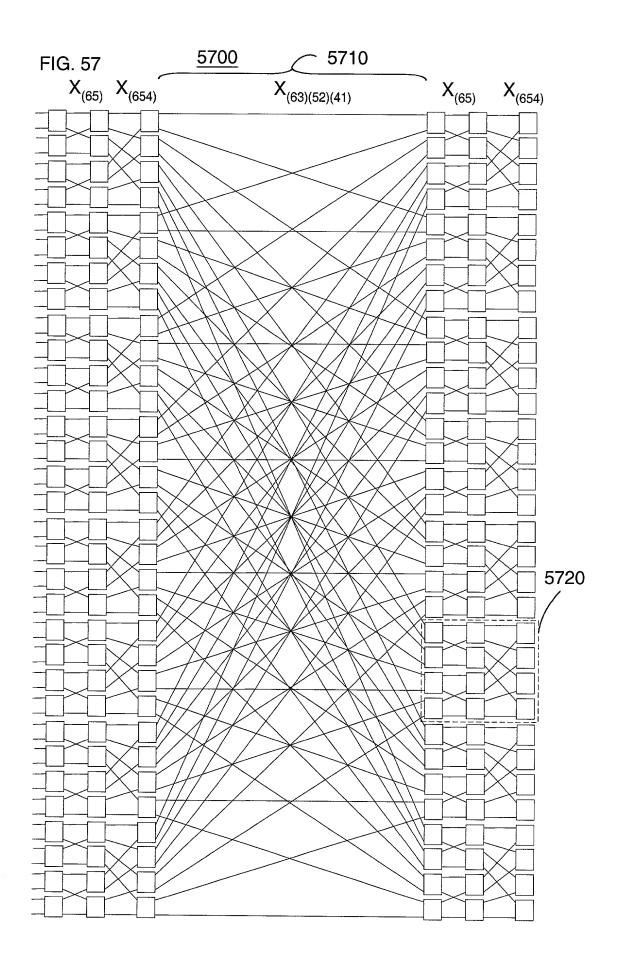
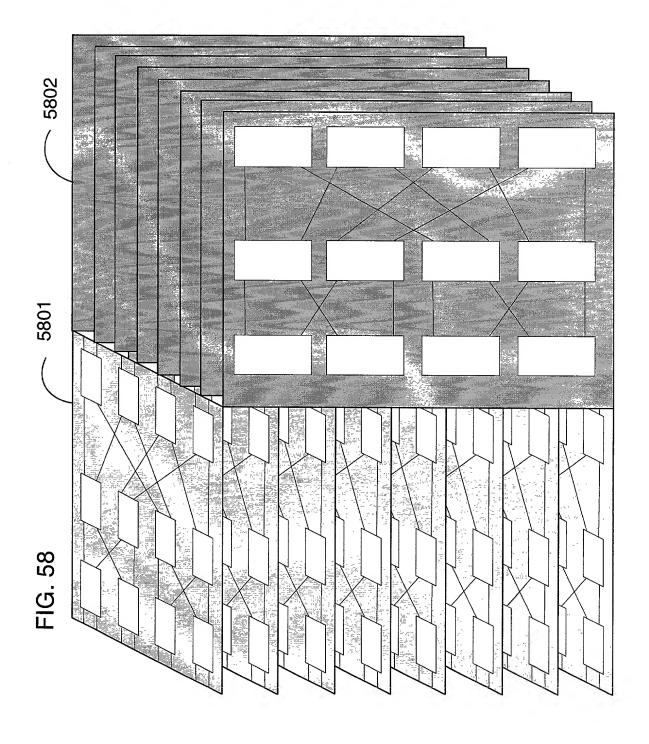
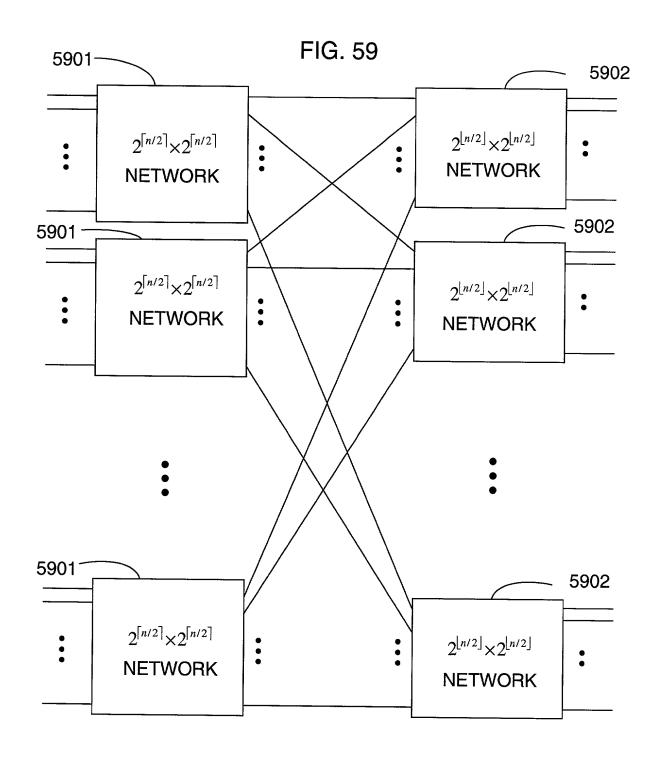


FIG. 55









# <u>6000</u>

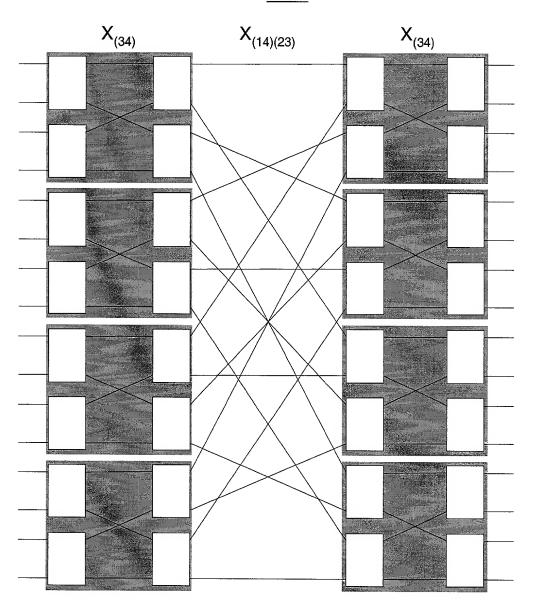
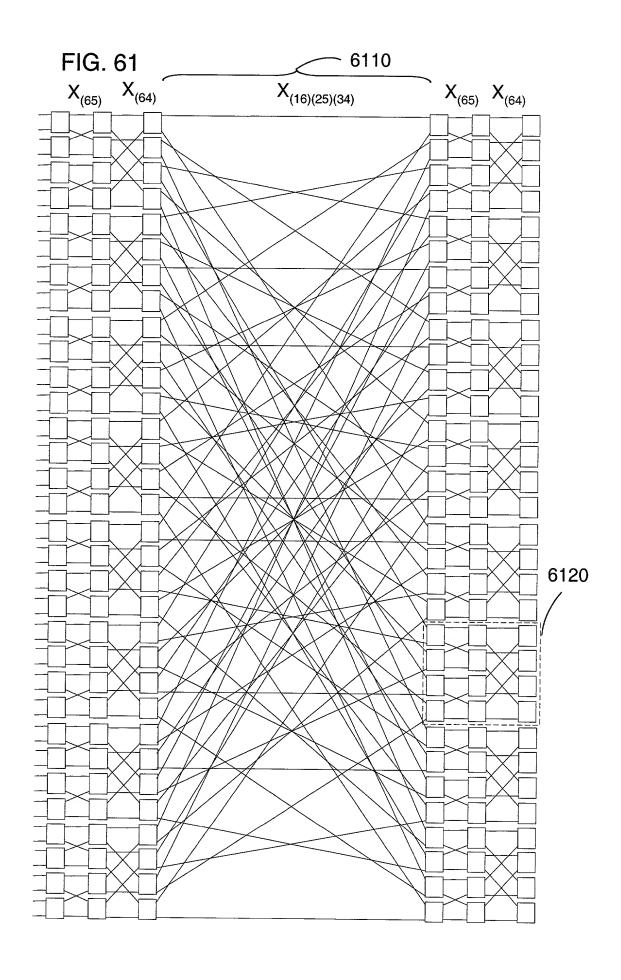


FIG. 60



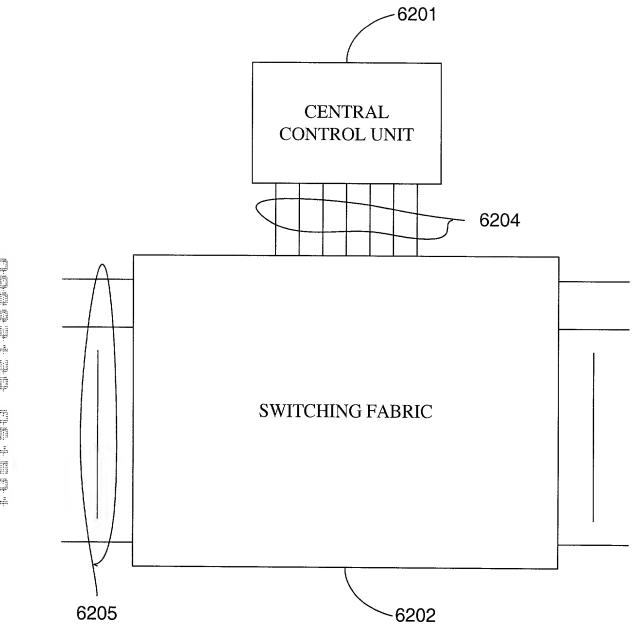


FIG. 62A

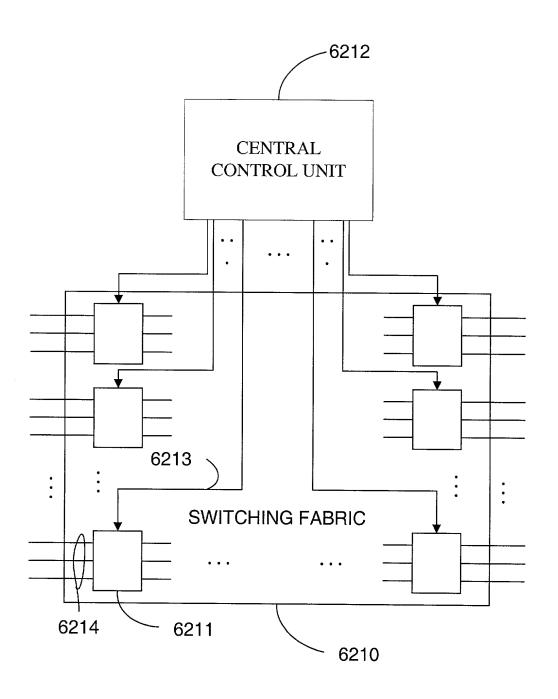
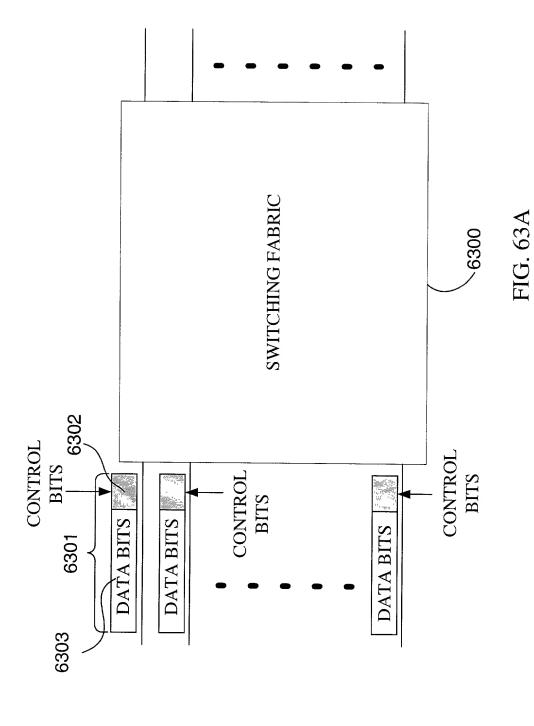


FIG. 62B



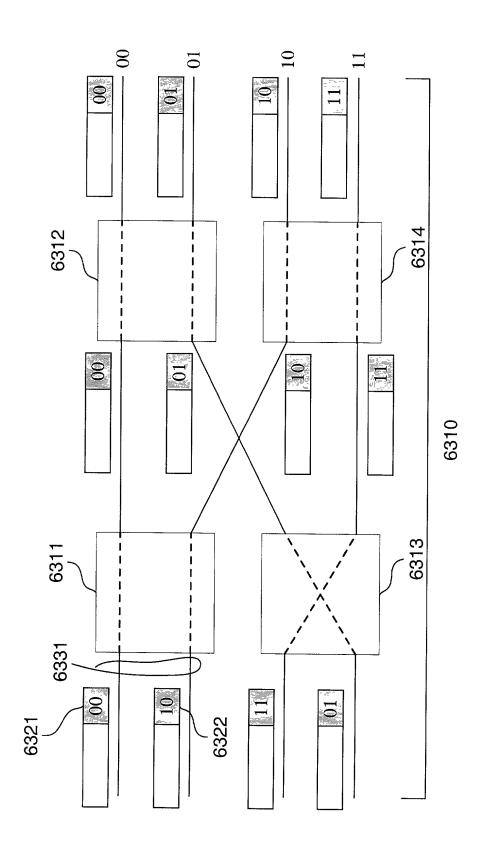


FIG. 63B

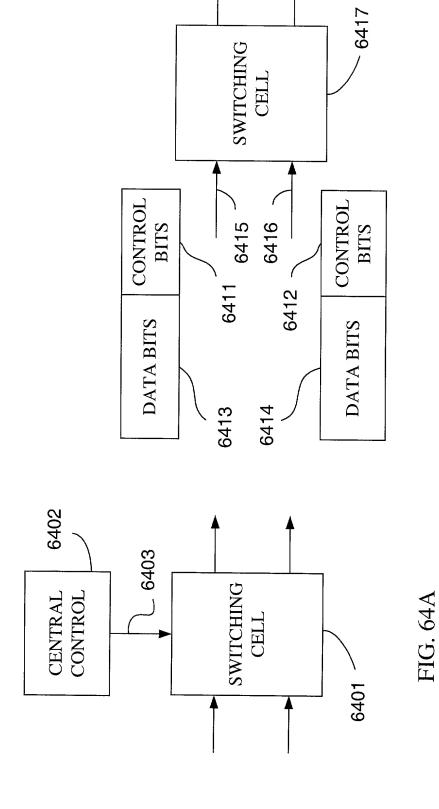
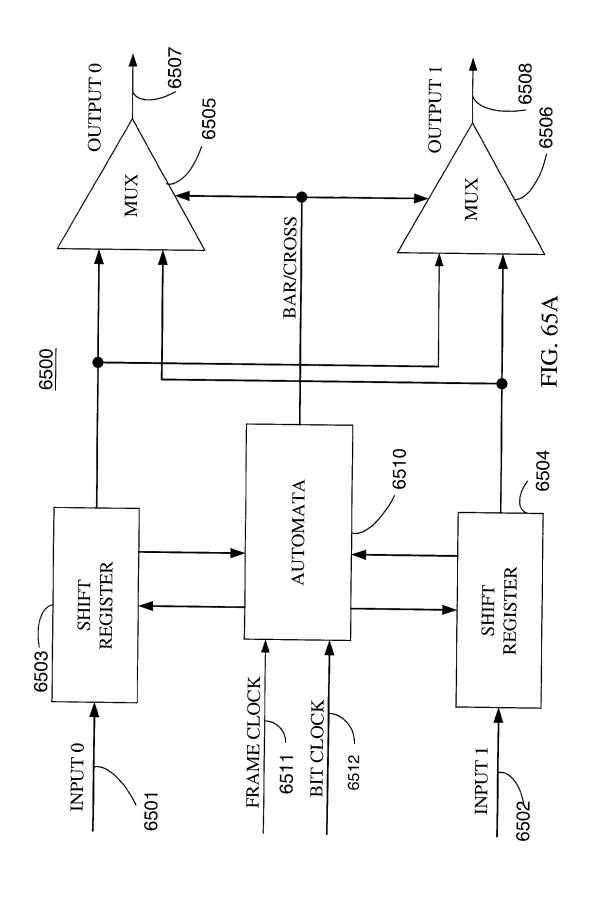


FIG. 64B



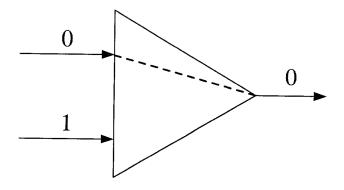


FIG. 65B

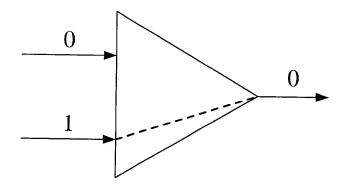


FIG. 65C

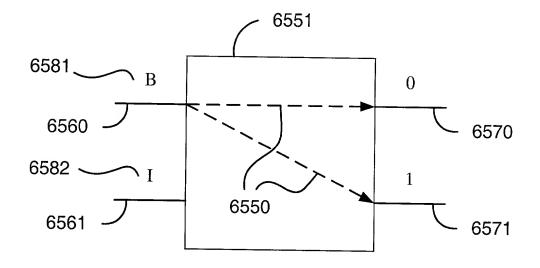


FIG. 65D

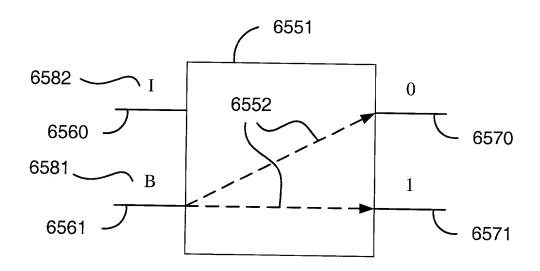


FIG. 65E

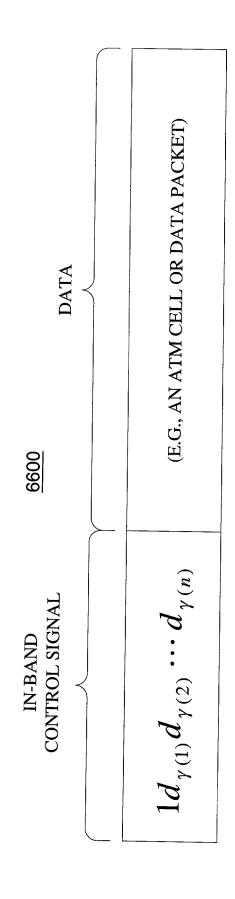


FIG. 66A

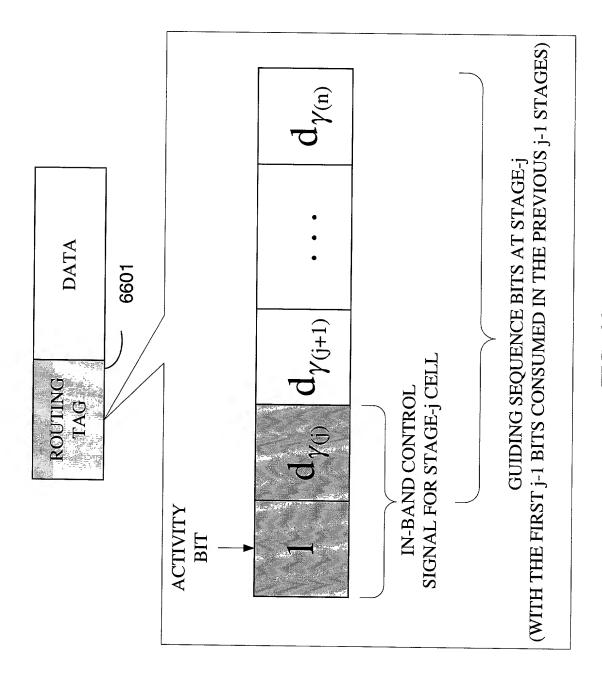


FIG. 66B

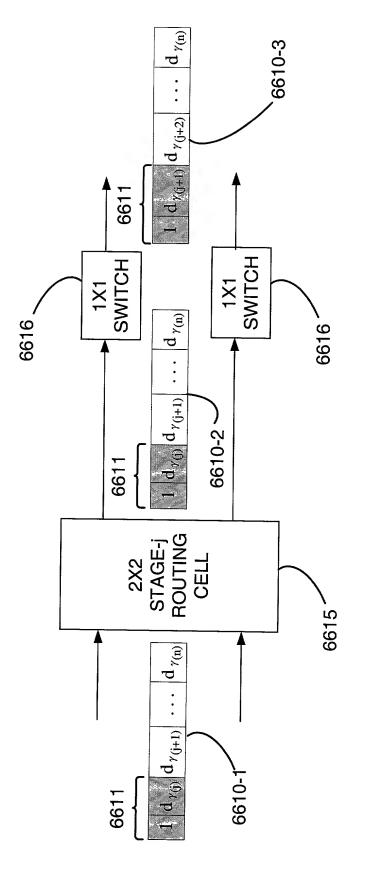
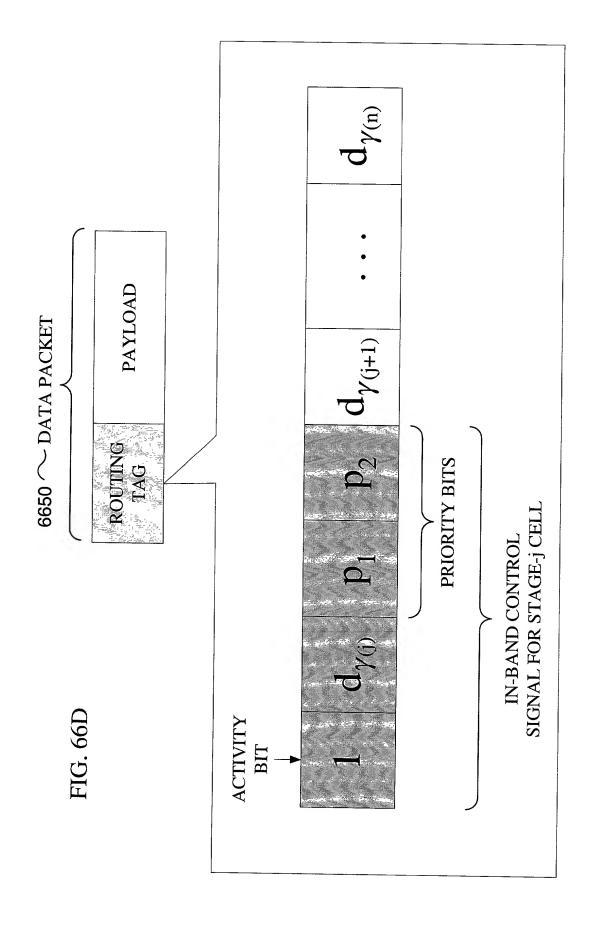
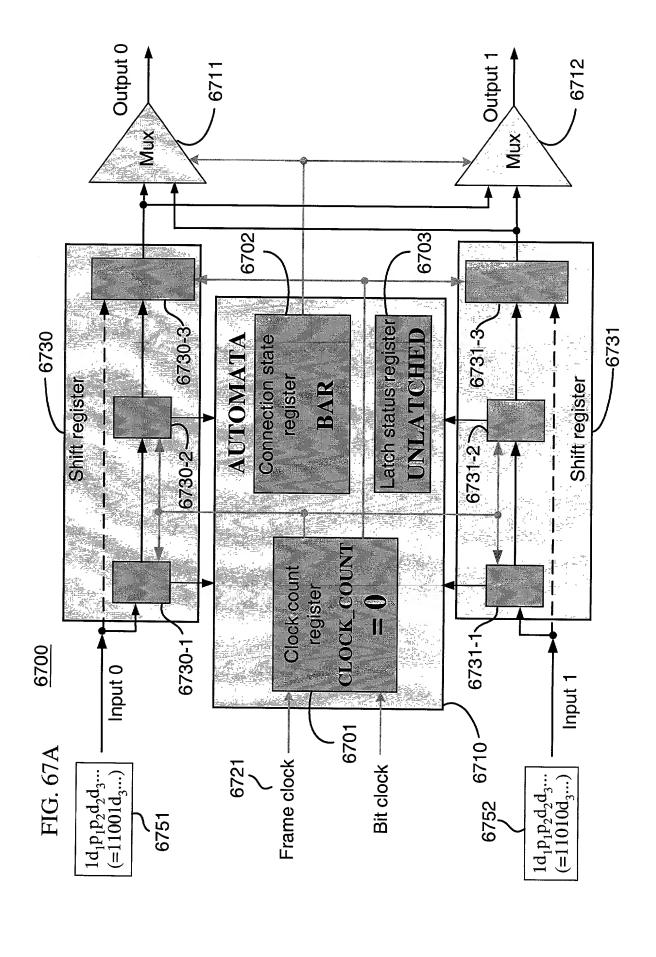
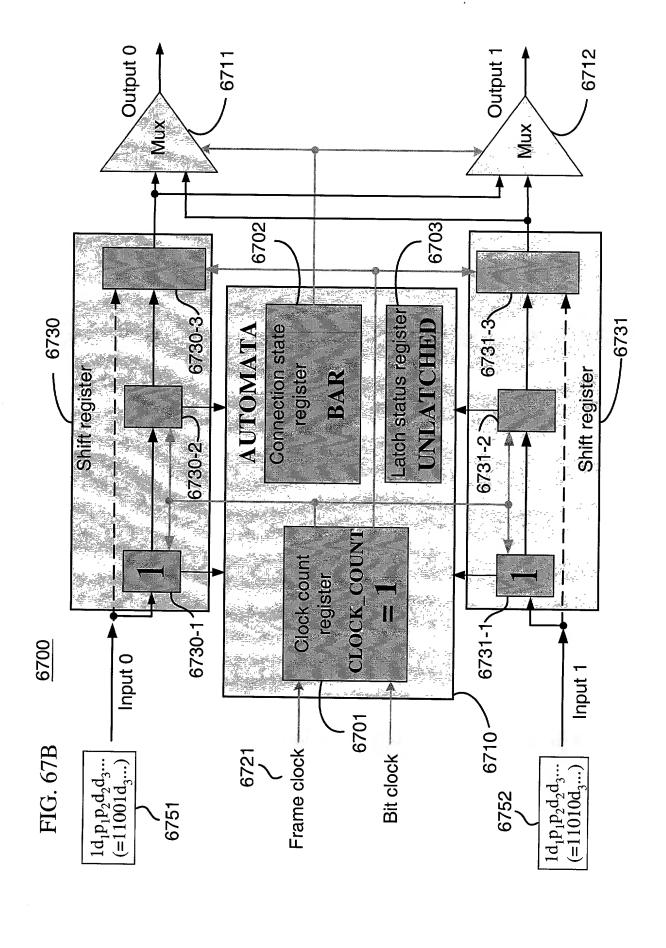
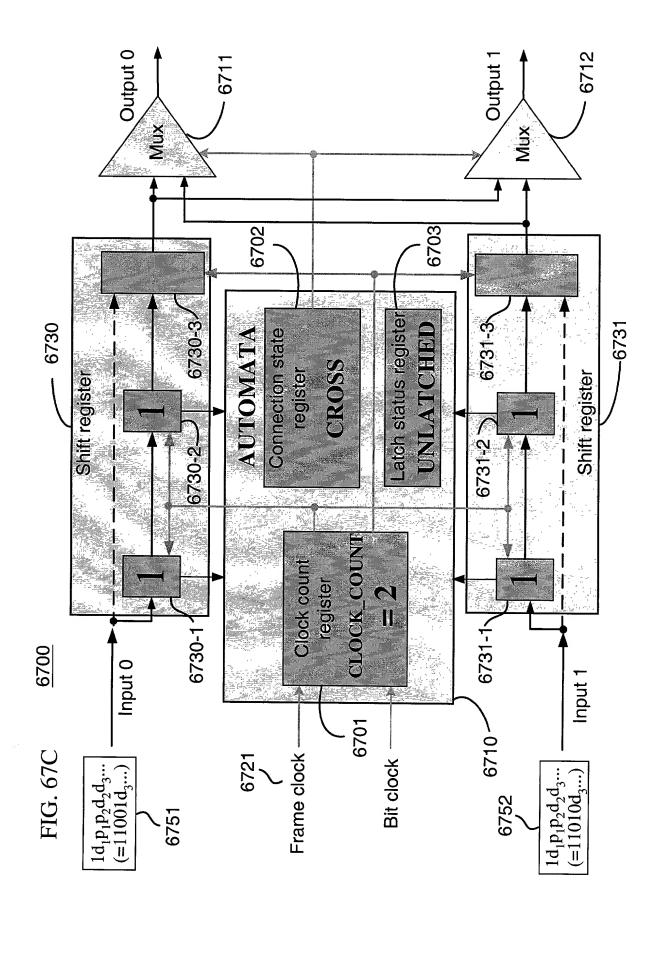


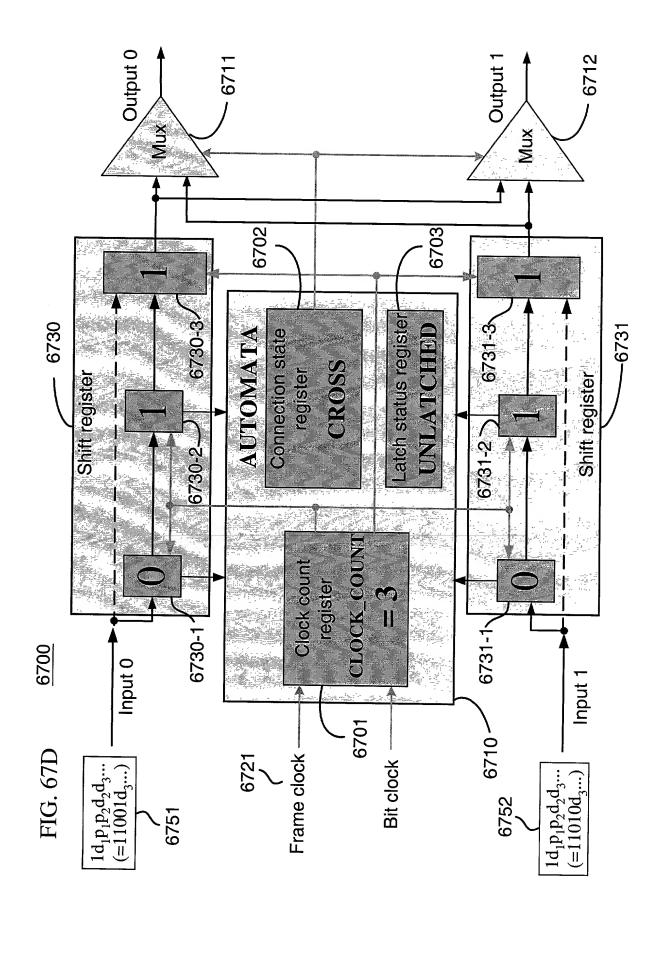
FIG. 66C

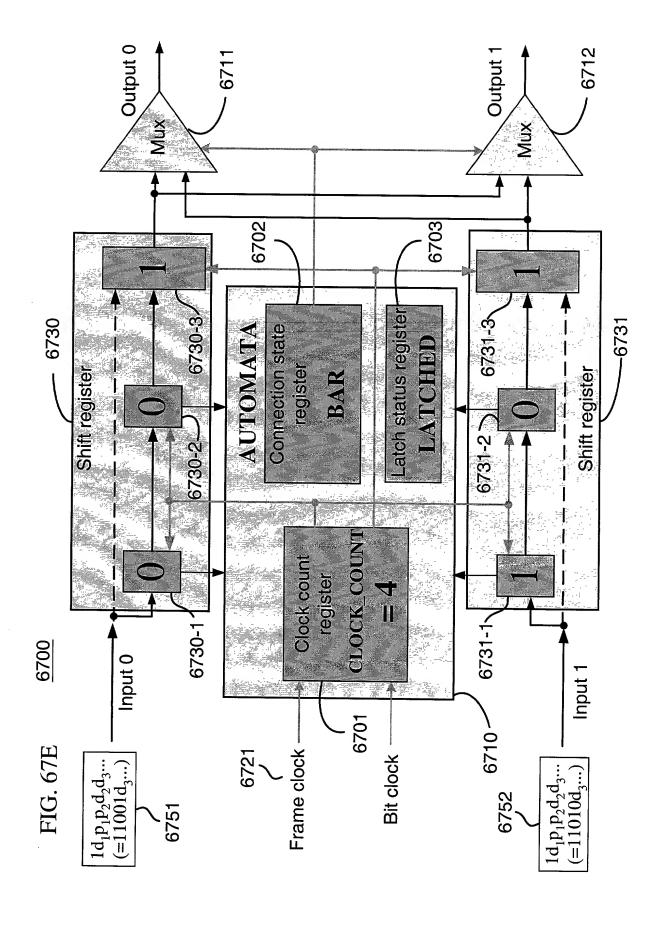


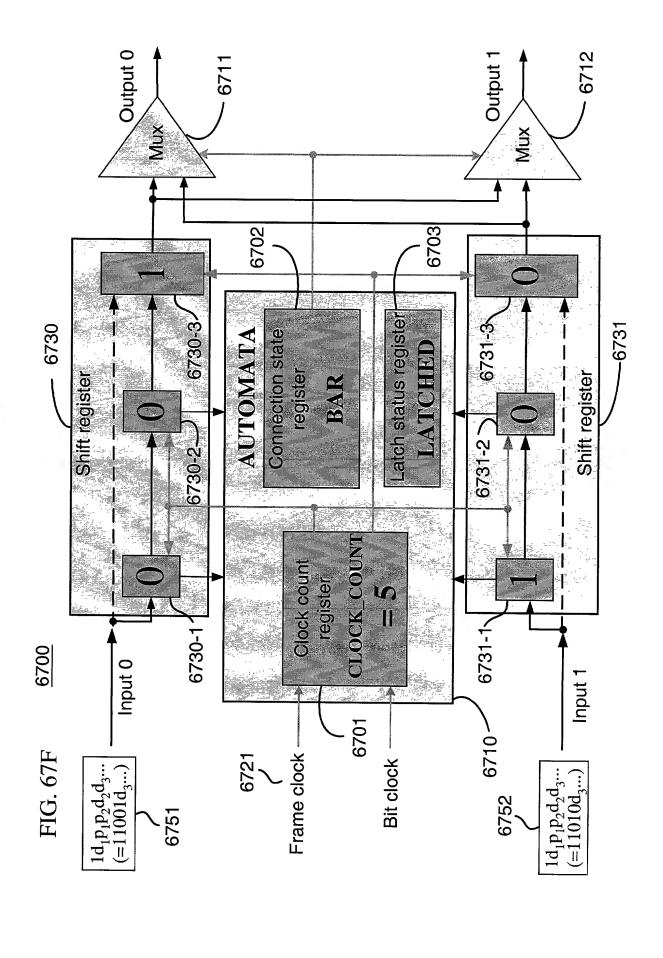












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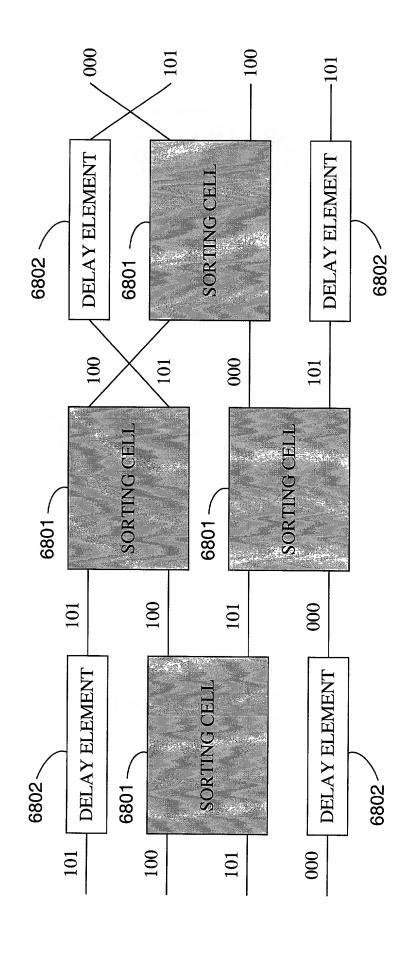
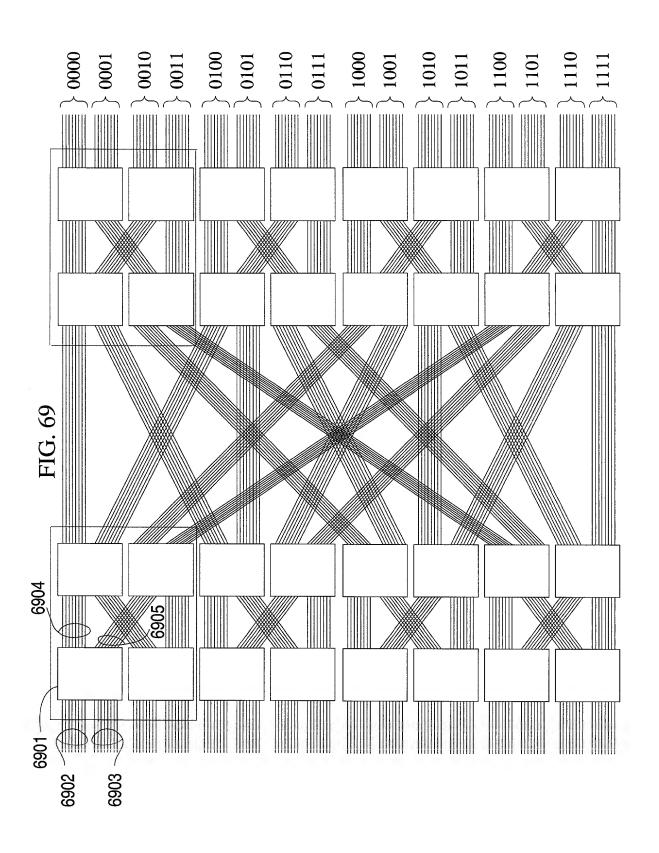
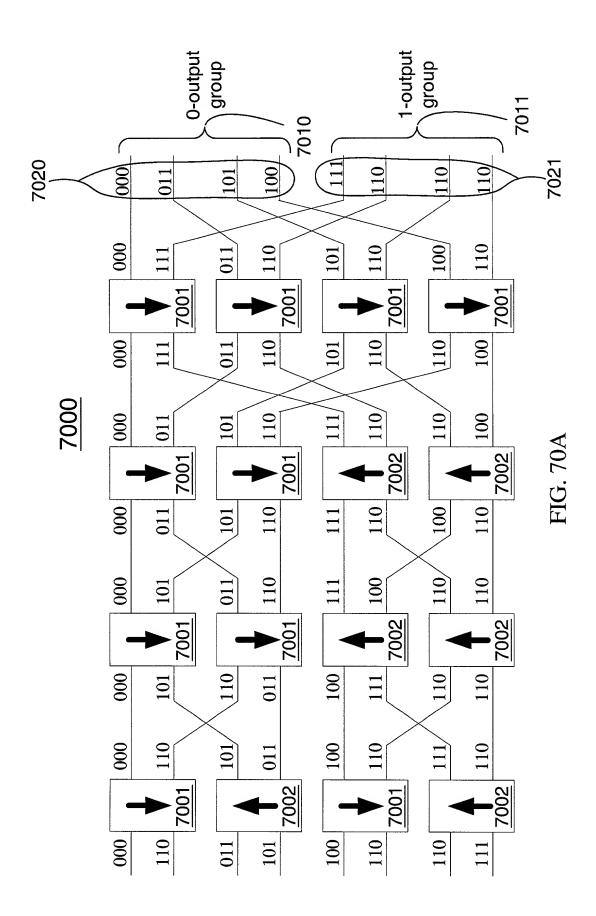
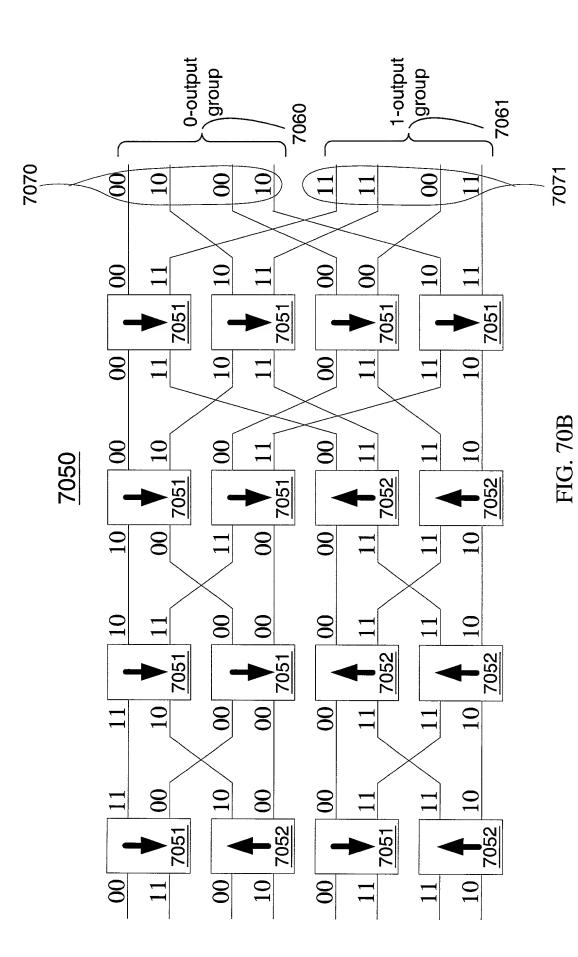


FIG. 68







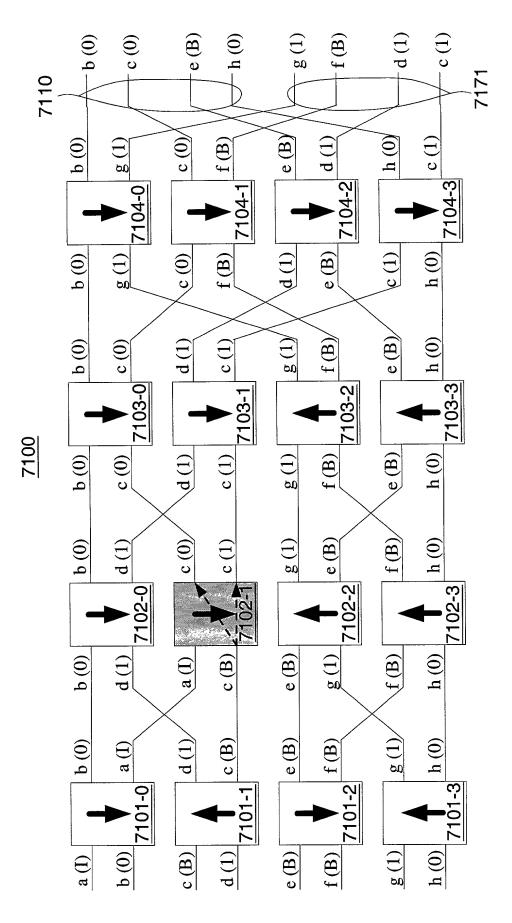


FIG. 71A

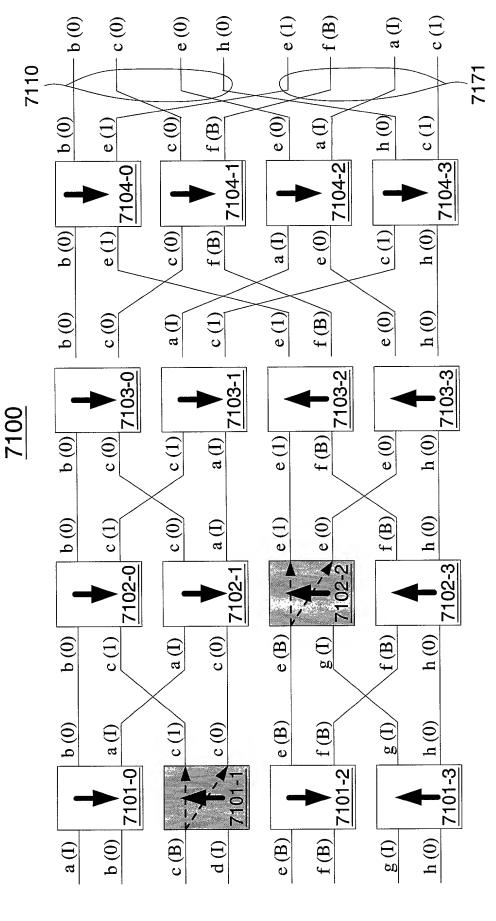


FIG. 71B

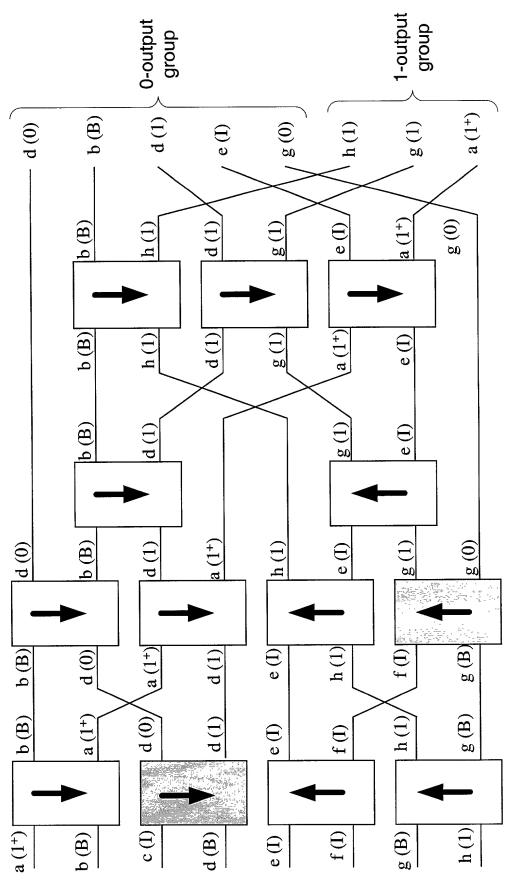


FIG. 72A

